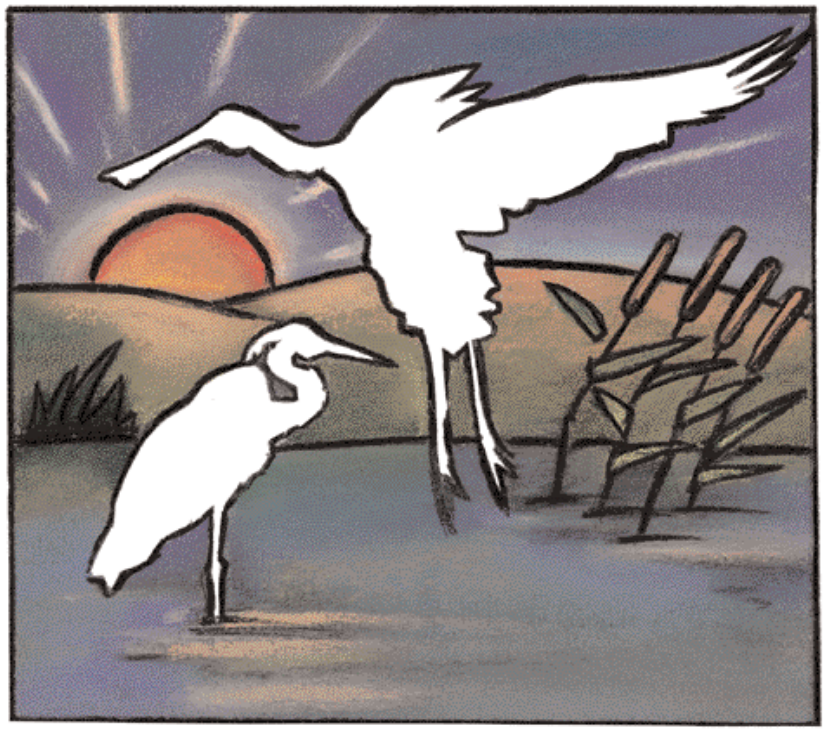
Economic Instruments and Water Policies in Central and Eastern Europe: Issues and Options

Szentendre, September 28-29, 2000

Conference Proceedings



THE REGIONAL ENVIRONMENTAL CENTER
for Central and Eastern Europe

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Szentendre, September 28-29, 2000

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Szentendre, Hungary
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THE REGIONAL ENVIRONMENTAL CENTER
for Central and Eastern Europe

About the REC

The Regional Environmental Center for Central and Eastern Europe (REC) is a non-partisan, non-advocacy, not-for-profit organisation with a mission to assist in solving environmental problems in Central and Eastern Europe (CEE). The Center fulfils this mission by encouraging cooperation among non-governmental organisations, governments, businesses and other environmental stakeholders, by supporting the free exchange of information and by promoting public participation in environmental decision-making.

The REC was established in 1990 by the United States, the European Commission and Hungary. Today, the REC is legally based on a Charter signed by the governments of 25 countries and the European Commission, and on an International Agreement with the Government of Hungary. The REC has its headquarters in Szentendre, Hungary, and local offices in each of its 15 beneficiary CEE countries which are: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, FYR Macedonia, Poland, Romania, Slovakia, Slovenia and Yugoslavia.

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Preface

Drastic changes in charging and pricing policies in the water sector of Central and Eastern Europe (CEE) have taken place since 1989 and are likely to continue. Increasing importance is being given to the environment at a national level, reinforced by the process of accession to the European Union (EU). For example, the Water Framework Directive, recently adopted by EU Member States, specifies the need for water pricing to provide incentives for consumers to use water in a more sustainable manner; in addition, financial resources will be required to aid governmental compliance with the environmental *acquis*.

The conference Economic Instruments and Water Policies in Central and Eastern Europe: Issues and Options was organised by the Regional Environmental Center for Central and Eastern Europe (REC) and DG Environment of the European Commission. The main objectives of the conference were:

- To review existing water pricing policies in CEE countries and in European Union Member States;
- To identify the key factors (technical, socio-economic, institutional) that explain existing water pricing policies;
- To assess the adequacy of existing water pricing policies for addressing present and future challenges faced by the water sector in CEE countries, with particular emphasis to the enlargement process; and
- To identify the key constraints, and also the potential for adapting water pricing policies to these objectives, and the challenges that lie ahead.

Those attending the conference included stakeholders and specialists from EU Member States as well as CEE countries. Many showed significant interest in using the framework of pricing to address environmental and economic issues in the water sector of the CEE. The conference also identified areas for future monitoring and research to ensure that pricing policies can be effectively designed and implemented.

We are very pleased to present the proceedings of this conference. We hope that this document will be a key to increasing awareness of the role pricing can play in enhancing the sustainability of water resources in the countries of Central and Eastern Europe.

J.F. Verstrynge
Deputy-Director General
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The Regional Environmental Center
for Central and Eastern Europe

Fifty points for a synthesis

Stefan Speck, Regional Environmental Center for Central and Eastern Europe,
and Pierre Strosser, DG Environment, European Commission[1]

BACKGROUND

1. Drastic changes in water pricing policies are likely to occur in the coming years in Central and Eastern Europe. These changes will result from the need to implement the Water Framework Directive, and more particularly its water pricing article (Article 9).

    - Water pricing needs to act as an incentive for achieving the environmental objectives of the directive.

    - An adequate recovery of the costs of water services is required for each economic sector (i.e. industry, households, agriculture).

2. Also, large financial resources will be required for maintaining and renewing the existing water services infrastructure, and to build (and maintain) new infrastructure to comply with the environmental *acquis*, e.g. the Urban Waste Water Treatment Directive. Pricing will play a key role in the provision of some of these financial resources.

3. In this context, the Regional Environmental Center for Central and Eastern Europe (REC) and DG Environment of the European Commission organized a Conference entitled *Economic Instruments and Water Policies in Central and Eastern Europe — Issues and Options* in Szentendre, Hungary, September 28 and 29, 2000.[2]

4. The objectives of the conference were:

    - To review existing water pricing policies in Central and Eastern Europe and compare them with existing policies in Member States of the European Union.

    - To identify the key factors (technical, socio-economic, institutional, etc) that explain existing water pricing policies.

    - To assess the adequacy of existing water pricing policies for addressing present and future challenges faced by the water sector, with particular emphasis to the enlargement process and the implementation of the Water Framework Directive.

1. The synthesis was based on the contribution of the rapporteurs to the technical sessions of the Conference. These were: Jim McNicholas (REC), Krzysztof Michalak (OECD), Charlie Avis (WWF, Hungary), Erich Unterwurzacher (DG Regio, European Commission) and Mojca Luksic (State Water Directorate, Croatia).

2. Financial support to the organisation of the Conference was given by the European Commission (DG Environment) the Technical Assistance Information Exchange Office (TAIEX), the Danish Environmental Protection Agency and the Ministry of the Environment of the Czech Republic via their support to the Sofia Initiative on Economic Instruments.

- To identify the key constraints and potentials for adapting water pricing policies to these challenges and objectives.

5. To achieve these objectives, the conference combined a number of technical sessions with presentations and discussions, two panel discussions on existing water pricing policies in Central and Eastern European countries and Member States of the European Union, a series of interactive case studies and a field visit to the Budapest wastewater treatment plant.

6. Overall, around 60 participants, from 20 different countries,[3] attended the conference. Both the speakers and participants represented a wide range of stakeholders (ministry experts, researchers, environmental NGOs, industry representatives, consultants) from both Central and Eastern European countries and European Union Member States.

7. This report summarizes the presentations and discussions that took place during the two days of this Conference.

THE CONTEXT IN CENTRAL AND EASTERN EUROPE

8. Steep increases in water service prices have been recorded in all Central and Eastern European countries since the change of the political regime, at the end of the eighties and beginning of the nineties.

9. A significant decrease in the demand for water has been recorded during the same period, particularly for large water users (e.g. industries).

10. However, the change in water prices is not the only factor explaining the decreasing demand. In fact, little is known on the marginal impact of price changes on water demand. The overall economic recession and changes in incomes are, among others, key factors explaining the observed reduction in water demand.

11. Prices for agricultural water/irrigation have not followed the same trend and have been kept at very low levels. However, this sector has also recorded a decrease in its water demand. Privatization of large farms to smaller units led to changes in agricultural approaches leading to a reduction in the water demand. Overall, water use by agriculture is limited in most countries as compared to the situation in southern European Union Member States, for example.

12. Because of the prospect of enlargement, and the need to upgrade the quality of the environment, very large (but not yet identified) investments will be required in new water infrastructures and the protection of the quality of waters. Financial resources from external sources, however, will not cover all these costs.

3. Countries represented included: Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, France, Germany, Hungary, Latvia, Lithuania, Macedonia, Poland, Romania, Slovakia, Slovenia, the Netherlands, the United Kingdom.

EXISTING WATER PRICING POLICIES IN CENTRAL AND EASTERN EUROPE AND IN THE EUROPEAN UNION

13. There is a wide diversity of water prices in Central and Eastern Europe and in the European Union, both in terms of price structure and price levels.

14. Overall, the recovery of financial costs (operation and maintenance, investments) is stricter in the Member States of the European Union than in Central and Eastern European countries. However, there is a wide diversity of situation on both sides.

    - The full recovery of financial costs is stricter for households than for agriculture in the Member States of the European Union.
    - On the contrary, it is stricter for industries as compared to households in Central and Eastern Europe.
    - Some farmers pay for their full financial costs in Member States of the European Union, while others hardly cover the operation and maintenance costs of irrigation systems. Further, in some water stressed regions of southern Europe, recovery can be less than one percent.
    - Full recovery of financial costs exists for some large cities in Central and Eastern Europe (e.g. Gdansk) as opposed to smaller cities or rural areas (when piped water services exist at all in these areas).
    - In cases where water services are provided by public entities or where prices are tightly controlled by state authorities, water prices have sometimes been used to pursue broader policy objectives to the detriment of the financial viability of the service provider, such as reducing inflation or before elections.

15. However, comparing cost recovery levels remains difficult and has to be made very cautiously, as the costs considered are rarely specified and likely to vary among countries or economic sectors.

16. Many countries use environmental (abstraction, pollution) charges or taxes. However, the environmental impact of these is unclear, partly as a result of their low level, to act as incentives. Also, these so-called 'environmental' charges or taxes are sometimes developed primarily for financial reasons to enhance revenues to the general budget (e.g. the groundwater abstraction tax and the water supply tax in the Netherlands).

17. Thus, existing environmental costs are rarely assessed/evaluated for designing the structure and level of these 'environmental' charges or taxes; i.e. there is no attempt to internalize external costs. Furthermore, revenues collected through such means are rarely 'earmarked' for funding measures aiming to redress the environmental damage for which they were imposed.

18. The review of existing pricing policies stresses the diversity of the institutional framework supporting these policies. In some countries, the private

sector has a key role in water services (e.g. the United Kingdom) and the state only regulates water prices. In other countries, the management of water services and the control of prices are entirely the tasks of municipalities and of the government (e.g. Romania).

IMPACT OF EXISTING WATER PRICING POLICIES

19. On average, water prices have a clear impact on water demand. However, the order of magnitude of this impact (and of related price elasticity of demand) varies widely between suppliers of water services, economic sectors, river basins, countries, and the time scale (long-run vs. short-run).

20. At present, there is little knowledge of the factors that explain the magnitude of the impact of prices on the water demand. In the case of agriculture, for example, land ownership, the access to alternative water sources, and the types of crops are factors likely to influence the magnitude of this impact.

21. Changes in water prices and reduction in water demand can have a clear impact on the environment. The case study of the city of Gdansk illustrated changes in the groundwater recharge and showed that groundwater levels were restored to past levels. It should be stressed that information on the environmental impact of water prices (e.g. on groundwater levels, river flows, groundwater quality or wetland status) is indeed very rare in the literature: analyses stop too often at the impact on the water demand *per se* and do not investigate related environmental impacts.

22. Transparent water prices can also have an impact on water demand through their information role, given that price structures and levels can have a psychological impact on consumers and users and thus modify their behaviour.

PRINCIPLES AND OBJECTIVES OF WATER PRICING POLICIES

23. Water as a good has many facets: as a support to life, provider of environmental services, as a transport medium, an economic good, an element of social cohesion (or conflict), etc.

24. To consider water globally (globally being defined as looking at the different facets of water, at both surface and groundwater sources, at the river basin scale, at more general macro-economic policies, etc.) is the key to adequate, effective and successful water pricing policies.

25. As a result, water policies in general and water pricing policies in particular attempt to achieve a wide range of objectives, be they environmental, economic, financial or social.

26. All stakeholders recognize this diversity of objectives. However, the weight and priorities given to objectives vary widely among stakeholders. For example:

    - Pricing is primarily a financing tool for the European Bank for Reconstruction and Development; for the World Wide Fund for Nature (WWF) it is primarily seen as contributing to the fulfillment of environmental objectives.

- Water pricing policies are also used to satisfy industrial or rural development policy objectives, which in some cases jeopardizes the efficient allocation of economic resources and environmental sustainability, e.g. in the case of excessive irrigation.
- Social issues and objectives are seen as particularly important for experts from Central and Eastern Europe.

27. There is agreement on the need to reconsider subsidies and cross-subsidies (mainly from industry to households in the case of Central and Eastern European countries) related to water services. Subsidies should be better targeted and made more transparent to consumers and taxpayers.

SOCIAL CONCERNS AND WATER POLICIES

28. Many experts have a great concern for social issues in the context of foreseen future increases in water prices. Clearly, affordability and capacity to pay will be key issues in future water pricing policies in Central and Eastern Europe.

29. Existing and future affordability were widely discussed, keeping in mind the controversial threshold of four percent as the maximum share of water service costs in total households income proposed and used by some institutions. No agreement could be reached on this.

30. The affordability figures cited during the conference were average figures for the population of a given city or country. The sole use of average figures for integrating social elements in water pricing policies is clearly inadequate knowing the wide diversity of household income in most (all) areas of Central and Eastern Europe and elsewhere.

31. The use of direct financial compensation was seen as more effective in addressing social issues.

THE ROLE OF STAKEHOLDERS

32. The state has a clear role to play in water pricing policies: establishing legislation, regulating, providing expertise, and safeguarding social and environmental concerns.

33. Municipalities can also play a key role in the regulation of water prices.

34. The role of consumers and users was widely discussed during the conference. Some felt that consumers were only asked 'to pay and to reduce demand' in most Central and Eastern European countries. However, examples of consumers/stakeholders/users' participation were presented for different countries.

- Participation and control by consumers through the democratic process in the case of the Netherlands (state level and local level) and the city of Gdansk (municipal level).
- Direct consultation of consumers in the case of the Compagnie du Bas-Rhône Languedoc (intensive discussions take place between the company

and farmers before any significant change in price structures and levels is proposed).

- Participation of stakeholders in river basin committee in the case of France (comité des agences de bassin) and Romania (pilot project).

35. However, no information was provided on the relative effectiveness of these different forms of participation to account for users and consumers' views and problems.

THE NEED FOR INFORMATION AND RESEARCH

36. Common definitions and concepts (which costs, what is cost recovery, etc.) are now required for EU Member States and Central and Eastern European countries to ensure the economic elements of the Water Framework Directive can be consistently implemented.

37. Methodologies for assessing the financial costs of water services need to be homogenized.

38. There is also a need to further develop and make operational methodologies for assessing environmental costs and benefits. Such methodologies and their application were little discussed during the conference (although three case studies were mentioned in the WWF presentation). Strategies for using water pricing to achieve environmental objectives need more attention.

39. More research is required to better understand the factors influencing water demand and pollution, and to assess the impact of price changes on water demand under a variety of conditions. This represents a challenge in countries such as those of Central and Eastern Europe where the entire economy has experienced significant changes recently.

40. Further efforts should be put into better measuring water uses and pollution, both in the European Union and Central and Eastern Europe. Although controversies may exist regarding the role of metering to reduce water demand, there is clear agreement that metering is key to building the information base necessary for taking policy and management decisions effectively.

MOVING TO NEW WATER PRICING — THE FIRST STEPS

41. The participants identified several steps for improving the role and effectiveness of existing water pricing policies and for moving to water pricing policies that better account for the environment. These include the need to:

    - Improve transparency and the information available for consumers, users and taxpayers on who uses, who pollutes, what does it cost and who pays for these costs. This can be done without any change in pricing policy.

    - Share bad and good experiences between stakeholders and countries with regards to water pricing policies in place and the role of key factors explaining their success or failure.

- Move to better pricing policies in a very practical way, i.e. using first the existing information and methodologies (e.g. for evaluating environmental costs and benefits) without waiting for further research and information.
- Account for existing water pricing policies in the development of new policies, and to implement these policies in a phased manner.
- Enhance interaction and collaboration between government departments and agencies representing different interests in water resource management (e.g. agriculture, environment, health).

42. There is a need to introduce consumers and users into the design process of new pricing policies. To understand consumers' rating of the varying quality of water services and the link they make between water service quality and prices is key to integrating consumers into water pricing policy design. In this context, users' and consumers' *willingness to pay* needs to be more systematically investigated. Often, however, there is limited capability to carry out such investigation, especially for small water service suppliers and municipalities.

43. Also, in the long run, the development of knowledge requires research activities on water economic issues to be strengthened. The Fifth Research Framework Program of the European Union provides opportunities for supporting such research in Central and Eastern Europe.

44. Pilot projects by a wide range of stakeholders can be effective means for testing new approaches (e.g. pricing policies, participation of consumers in design of these policies, pricing and river basin management, etc.), sharing experiences and demonstrating the benefits such approaches can have for users and for the environment. The Life Programme of the European Union provides opportunities for supporting such pilot projects in Central and Eastern Europe.

45. Pricing policies will need to be integrated into the development of river basin management plans. This integration remains a key challenge for the implementation of the Water Framework Directive to be addressed from the beginning of activities aimed at developing guidelines for implementing the economic elements of the directive.

46. Finally, pricing policies need to adapt over time to changes in economic, hydrological and social conditions. The example of the compagnie du Bas-Rhône Languedoc was very illustrative in this regard: this company has used four different pricing structures since its creation, the existing pricing structure being similar to the first pricing structure in use in the company a few decades ago! Thus, to integrate economic analysis into routine activities for designing pricing policy is as important as to identify the price level and structure that will address today's issues.

WHICH FOLLOW-UP TO THE CONFERENCE

47. The REC and DG Environment will publish the proceedings of the conference by the end of the year. These proceedings will be widely distributed to the participants of the conference and other economic and water policy experts in Central and Eastern Europe and in the European Union.

48. The REC and DG Environment will disseminate the final results of their ongoing studies on water pricing in Accession Countries and agricultural water pricing when finalized.

49. A key outcome of the recent Lille II conference, organized in Lille, September 13 and 14, 2000 under the auspices of the French Presidency of the European Union, is the agreement among experts on the need to develop practical guidelines for implementing the economic articles of the Water Framework Directive. The discussions during the Szentendre conference clearly stressed that:

    - There is a clear demand for (and need to) involving experts and stakeholders from Central and Eastern Europe in the process of guideline development.

    - This involvement should start immediately, to ensure understanding, input into, and appropriation of these guidelines by users in Central and Eastern Europe. In this context, it is important to associate the experts that attended the Szentendre conference to all networking activities and discussions that may follow from the Lille II conference, and to publicize the process in order to invite contributions from those not able to attend the Lille II or Szentendre conferences.

    - The guidelines should not only discuss what the economic analysis should aim at, but also (and more importantly) how to achieve this economic analysis.

50. There is a need to compile (and regularly update) the list of existing studies and activities linked to economic issues (i.e. economic analysis, water pricing) undertaken by stakeholders and organizations in Central and Eastern Europe. In this context, the possible setup of a sub-working group on economic issues led by the Danube Commission was mentioned. Also, a study on water tariffs in the Danube Basin is currently ongoing, which would complement the study by DG ENV on water pricing in Accession Countries.

Water pricing in selected accession countries to the European Union — current policies and trends[1]

Pierre Strosser, DG Environment, European Commission

BACKGROUND

Economic instruments are increasingly applied in the context of environmental policies. This is particularly true for the water sector where the application of abstraction and pollution charges, or incentive price structures is favoured to promote the efficiency of water use and reduce the discharge of harmful pollutants into the natural environment.

The Water Framework Directive (WFD), recently adopted by the Member States of the European Union, clearly integrates economic concepts and approaches into water policies. Firstly, it promotes the use of economic analyses to identify measures for achieving the environmental objectives of the directive cost-effectively. Secondly, it advocates the use of water pricing as an incentive encouraging the sustainable use of water resources. Also, the directive makes compulsory an adequate recovery of the costs of water services from each economic sector, i.e. household, industrial, and agricultural.

In the Accession Countries to the European Union, incentive pricing and cost-recovery are likely to soon become key policy (and political) issues. There will be a need to implement the charging/pricing article of the Water Framework Directive. This is likely to be extremely sensitive in the context of the high costs of implementing the overall environmental *acquis* (e.g. the Urban Wastewater Treatment Directive). Thus, cost-recovery and affordability issues will gain prominence on the policy agenda.

METHODOLOGY, INFORMATION

Today, there is little knowledge on existing water pricing policies in Central and Eastern European countries (CEECs). Information is scarce also on their social, economic and environmental impact, and on the changes that would be necessary for the implementation of the environmental *acquis* and the charging/pricing article of the Water Framework Directive. In this context, DG Environment has launched a preliminary study[2] with the following objectives:

- To collect information on water and wastewater pricing in selected countries from Central and Eastern Europe;
- To analyse current water pricing policies and trends in the use of pricing mechanisms in the water sector;

1. This paper is based on a study funded by European Commission DG Environment, and contracted to the Krakow University of Economics. For more information on the results of the study please contact Pierre Strosser, Tel: (32-2) 296-8743, Fax: (32-2) 296-9559, Email: pierre.strosser@cec.eu.int.

2. The study was initially planned for a five-month period. The work was restricted to a review of existing documentation, reports and grey literature, and to the collection of information for some well-selected case studies.

- To acquire a better understanding on how the relevant information and data are gathered in these countries.

The study has investigated water pricing policies in ten Accession Countries to the European Union; Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. Information has been collected for the main water use sectors referred to in the pricing article of the WFD, i.e. household, industrial and agricultural.

The information used in this study has been collected from the following sources:

- Existing comparative studies (e.g. OECD, World Bank);
- National reports and documentation;
- Studies by water suppliers or water supplier associations (existing in some countries only);
- Case studies produced by researchers and consultants (often in the context of projects funded by international lending agencies);
- Direct interviews with experts, ministry officials, water suppliers, etc.

Many problems have been faced with the information collected and analysed. The information is highly heterogeneous, with different definitions, data collection methods or levels of aggregation being used in different countries. In some cases, problems are faced in accessing existing information. Thus, it is difficult to make in-depth comparative analyses between countries.

PRELIMINARY RESULTS

Some preliminary results are presented below. These refer to household water pricing, the sector for which the set of information is the most complete for the ten countries considered.

- *Metering*
  Metering of water supply to households ranges from 62 percent in the Czech Republic to 100 percent in Slovenia. However, reliable information on metering is scarce. Difficulties arise with regard to the way rural and urban areas are considered or with problems presented by multi-apartment houses.

- *Pricing structure*
  Pricing structures in Central and Eastern Europe make wide use of volumetric pricing. However, flat rate pricing, linked to the number of users, the type and capacity of the equipment or the size of the area served, continues to exist.

  In many countries, households pay a fee for water abstraction. These abstraction fees often differentiate between surface water and groundwater supplies. In Estonia and Romania, abstraction fees vary among river basins, as a function of water scarcity.

- *Average water supply price*
  On average, water supply prices range from EUR 0.14 per cubic meter (m^3) in Slovakia to EUR 0.47/m^3 in Hungary. However, there is a high diversity of prices within each country. Although many factors may explain observed price differences (e.g. density of supply network, age and level of maintenance, etc), it was not possible to make in-depth comparative analyses because of differences between countries' base years and sampling rules.

- *Wastewater charges*
  Wastewater charges in CEECs range from EUR 0.07/m^3 of water to EUR 0.47/m^3 of water. The table below presents the best available estimates for the ten countries considered.

- *Share of water expenditure in household budgets*
  On average, water expenditure, i.e. water supply and wastewater, represent 2.1 percent of the total household budget in the ten countries investigated. The lowest value is found in Slovakia with 0.6 percent while Romania records the highest value with 4.5 percent.

TABLE 1

Wastewater charges
(in EUR/m^3)

Country	*Charges*
Bulgaria	0.07
Estonia	0.28
Hungary	0.45
Latvia	0.38
Lithuania	0.37
Poland	0.29
Romania	0.41
Slovenia	0.10
Czech Republic	0.09
Slovakia	0.47

CONCLUSION

The preliminary results presented in this paper will be refined and expanded to include information from other economic sectors, i.e. industrial and agricultural. Key to the study and analysis will be the identification of existing information gaps in anticipation of the forthcoming implementation of the WFD and of its pricing/ charging articles. The reduction of information gaps will be required to ensure the implementation process can be effectively monitored and assessed.

The role of prices in irrigation in Central and Eastern Europe[1]

Judit Rákosi, ÖKO Inc., Budapest, Hungary

1. ROLE OF AGRICULTURE IN THE WATER SECTOR

Modification of ownership structure has brought about changes which have fundamentally affected farming conditions in Central and Eastern European countries (CEECs). Ownership reform has resulted in the fragmentation of land and a drastic reduction in the average size of holdings.

Service facilities, machinery and equipment, designed for large holdings, could not be used by small-scale farms. Due to a lack of capital, the purchase of a machine fleet, appropriate to land size, could be effected only with difficulty. Irrigation schemes, developed in the previous period, have not been operating or have been operating only partially. Yields have also fallen short of those in the years 1988-89. All this has resulted in a lower level of mechanisation in production, less irrigation and fewer developments not directly related to production.

Water consumption for irrigation is a proportionately insignificant component of water use in the economies of CEE countries. The highest percentage of water used for irrigation is observed in Romania, 6.7 percent in 1998; the next in Slovakia, 3.7 percent in 1999; then Hungary, 2 percent in 1998; and, lastly, in Bulgaria, 1.4 percent in 1997 (Reference 2). Water consumption in agriculture includes the following activities: irrigation, livestock breeding, and fish farming. The breakdown for water consumption in these categories varies from country to country. Comparative figures for some CEE countries (1997) are indicated in Table 1.

In Hungary, agriculture is one of the largest consumers of water sold by the water supply sub-sector. Agricultural water consumption is practically equal to the quantity of drinking water supplied. Most (some 60 percent) of the water sold to agriculture is used for fish pond supply; 15 percent to 30 percent is used for irrigation purposes, depending on weather conditions.

2. INSTITUTIONS AND ACTORS

In all CEE countries, the institutional and legal framework of water management had usually been established prior to the changes in economic and political systems. Irrigation activity shows similar and differing features in each country.

In Bulgaria, there are basically two well-established forms of irrigation. One of them is the responsibility of the Irrigation System Company (ISC), owned by the Ministry of Agriculture and Forestry (MuoAF). Its area of activity includes the operation and maintenance of state-owned irrigation schemes in an area of about 600,000 hectares (ha). The other is the responsibility of the water users associa-

1. This paper is based on a study funded by the REC. For more information on the result of the study, please contact Stefan Speck, Tel: (36-26) 505-056, Fax: (36-26) 311-294, E-mail: sspeck@rec.org.

tions (WUA), representing associations formed by small-scale farms to facilitate irrigation. ISC provides assistance for the operation of WUAs. Interestingly, according to the findings of investigations conducted in the years 1998-99, WUA's irrigation costs are 55-80 percent lower than those of ISC. On the basis of these investigations, it is evident that bigger irrigation systems provide irrigation water more expensively (owing to the long distances and several pumping stages). Smaller irrigation systems using groundwater wells are more effective and, thus, the price of irrigation water is more economical.

In Hungary, actors in irrigation are highly diverse. Basically, a distinction can be made between irrigation supplied by piped water and that drawn from natural water resources. Irrigation based on the piped water supply takes place through state-owned main works; water is supplied to the site of irrigation by WUAs, business or the farmers themselves. Two-thirds of irrigation takes place in this form. In the case of water withdrawal from natural water resources, an association, business or the farmer himself abstracts water. The choice of option (of course, only after the water licence has been obtained) is influenced only by the criteria of economic efficiency. In practice, water may be delivered in many ways from the site of water withdrawal to the site of irrigation. In these cases, the required facilities belong to the supplier.

In Romania, the key institutional structure in irrigation activity is the National Society of Land Reclamation (NSLR). It has branches (former Land Reclamation Operation Enterprises) at a local level. Another important stakeholder will be the association of irrigation water users. This association will share the process of decision-making on basic issues with the NSLR.

In Slovakia, the Slovak Water Management Enterprise is responsible for water delivery. It operates in two ways:

- Operating its own systems for abstracting, purifying and supplying water (about ten percent of areas).
- Contractual arrangements with other service companies, providing services for farmers; with agricultural companies, either users or owners of the land under irrigation (about five percent of areas).

Differences among irrigation systems in Slovakia are negligible. The irrigation system consists of two main parts:

- The main irrigation system: water resource; pumping stations; and underground pipeline network.
- Irrigation facilities and equipment, on a farm level.

The main irrigation systems (MIS) are owned by the state. Since 1994, the Slovak Water Management Enterprise, together with its local representatives, the river basin administrators, has become the manager of MIS. Irrigation facilities and equipment are owned by legal persons.

Government bodies have a major role to play in irrigation structure. Main works are owned by the state in all countries. Government bodies play a key role

TABLE 1

Comparative figures for agricultural water consumption in the CEE

Country	*Water for irrigation (million m³)*	*Total agricultural water use (million m³)*
Bulgaria	92.5	124.6
Romania	286.9	1030.0
Slovakia	47.0	86.0
Hungary	92.5	554.6

in price setting (except Hungary) and subsidies. It would be worth reconsidering the institutional system and hierarchy of irrigation activity.

3. IRRIGATION PRICING POLICIES

The raw water price is not a major component of irrigation costs (20 percent in Hungary, 25-30 percent in Slovakia).

In Slovakia and Romania, the government fixes prices, whereas, in Hungary and Bulgaria, market forces largely determine prices. In Hungary, irrigation charges fall within the free price category; consequently, prices vary from supplier to supplier. They usually cover operating and maintenance costs, as well as a portion of development costs; the development of state owned main works is financed by the state budget while the development of irrigation works, by WUAs, is financed mainly by members' contribution fees and state subsidy. A water resource fee is also charged, which is a state revenue and covers part of the costs of water resource conservation.

In Slovakia and Romania, where the price is established by the state, uniform charges are applied countrywide, and the only difference is occasioned by the source and purpose of water withdrawal. Prices cover only a portion of costs. In Romania, a raw water price is applied.

Subsidies

Subsidies for irrigation, and other incentives, exist in many countries. In Slovakia, supports may cover the price of irrigation water, the energy cost of irrigation as well as the operating and maintenance costs. The level of support may be as high as 70 percent of the price of irrigation water and the energy cost.

Regarding expenses connected to irrigation, state contribution is very considerable in Romania. Electricity costs and the costs of water delivery to the site of use are paid for by the state. In Hungary, supports are granted primarily for development and, in certain cases, for maintenance activity, but an operating subsidy, for example, a price subsidy, has not been available to date (except for drought periods). In conclusion, improving the water pricing system and establishing prices that cover costs may have an important role to play in irrigation development. Bulgaria has no general subsidy system. Sometimes the ISC receives state subsidies.

In the countries considered, there are considerable differences in irrigation water prices and water prices in general,. There is a discrepancy in both the adop-

TABLE 2

Country	*Price setting organisation*	*Cover for costs*	*Water price structure*	*Difference in price*	*Level of prices (EUR m³)*	*Support*
Bulgaria	ISCs at the MoAF and WUAs (private sector)	O+M costs and in some cases a part of the capital costs	Variable price (per hectare or per m³)	According to the source of irrigation (gravity feed or pumping)	0.007-0.075 (permanent maximum price: EUR 5 per hectare)	No subsidy for the private sector. Sometimes state subsidises ISC
Hungary	Water supplier	O+M costs and in some cases a part of the capital costs	Permanent variable or a combination of the two	Depending on the different cost level of suppliers	0.004-0.036 (permanent price: EUR 6-36 per hectare)	Mainly for development (40% grant, 30% soft loan)
Romania	Government	No direct relationship	Raw water price	According to the purpose of water use and the category of water withdrawal site	0.0004	Costs are covered by the state
Slovakia	Government	No direct relationship	Maximum price is set	According to contract range 0-2.0	0.048	Up to 70% support is available for costs

tion of market pricing and the recognition of costs. Table 2 presents a summary of the main aspects.

4. IRRIGATION SCHEMES

An irrigation scheme has been selected in each of the four countries for which case studies have been prepared.

In Bulgaria, the area studied is a 1,510 ha area of farmland situated near the village of Katunica (Plovdiv). Land reform has affected the total land area and now 720 private farmers and ten tenant farmers use the area for agricultural production. There are 100 regular irrigation water users. Irrigation activity is carried out by the Katunica Irrigation Water User Association, the first such type of association in Bulgaria. The irrigation scheme was formerly operated by a farming co-operative. The main crops are: maize, carrot, peppermint, peanut, watermelon, black pepper, sunflower and tomato. In 1998, a reconstruction of the irrigation scheme included the construction of open canals and advanced water distribution systems; the reconstruction was financed by a World Bank loan. On average, the total irrigation water quantity per hectare is 4,800 cubic meters (m³), and the total water quantity is 2.8 million cubic meters. One thousand hectares are irrigated, out of 1,500 ha. The average yield is higher than the national average. Following reconstruction, some changes have occurred in the production structure with a reduction in the maize and wheat producing area, while the peppermint producing area has increased considerably and now peppermint is produced in an area of a size similar to that of the wheat and maize producing area.

In Hungary, the area studied is situated in the region of Dunaegyháza, close to the Danube, and is farmed by a shareholders association. The shareholders, who are all land owners, rent out their respective land to the association. The area was formerly owned by a farming co-operative. Farming activity is carried out in a 1,000 to 1,400 ha area. The area includes an irrigated area of 700 ha with the rest of the area also being irrigable. The association's typical crop is potato, which has a high irrigation requirement. Potato is typically irrigated five to seven times per year by sprinkler irrigation, delivering 20-30 mm water each time. In the case of potato, there is no alternative to irrigation; irrigation was taken into consideration from the outset when choosing the 'main crop'. The need for crop rotation requires the production of other crops also. The most important supplementary crops include maize, wheat and green pea, of which, wheat requires minimum irrigation or practically none at all. Irrigation activity can be considered economically efficient and effective where farmers who own lands are organised into an association or business company, operating a specific irrigation scheme. The purpose of the various forms of association may be irrigation only (Bulgaria, Romania), or farming activity as a whole (Slovakia, Hungary).

In Romania, the area considered is relatively large (49,464 ha). It is situated in Dambovita and Giurgiu counties in the south-eastern part of the country. The yields in this area are much higher compared with the average yields achieved in non-irrigated areas. Average yields for wheat, maize and green maize are over 60 percent, 130 percent and 450 percent higher, respectively, when an average quantity of irrigation water is applied, than yields in non-irrigated areas. The irrigation scheme is operated by the National Association of Land Reclamation – S.A. under a concession contract concluded for 49 years. Because of the large number of farmers within the area, operating the irrigation scheme causes difficulties. Typically, each farmer irrigates his own land and common use occurs rarely. The irrigation scheme was formerly owned by a co-operative. Farmers in the area consider irrigation as key to production growth.

In Slovakia, the area studied is situated close to the settlements of Kostoliste and Jakubov on the West Slovakian Lowland. An association cultivates 1,935 ha. Sixty percent of the land area is owned by members of the association and 40 percent is leased. Most of the leased land is the property of the Slovakian Land Fund. The land was formerly owned by a co-operative.

The irrigation scheme is operated by the association's own irrigation centre. The association carries out water withdrawal from a surface water source (Morava River) under a contract with the Danube River Basin Authority of the Slovakian Water Management Enterprise. On the sandy soil, the main crops produced are maize and wheat. Average yields are considerably higher than the national averages (by about 20-40 percent). These good average yields are mostly attributable to irrigation, but, contributory factors also include high quality biological raw materials; a liquid nutrient supply combined with composting; and a highly qualified, co-operative expert team.

In all countries, the case studies demonstrate that irrigation activity was efficiently carried out when the farmers joined forces and formed some kind of association. The association resolved the problem of the decline in irrigation after

the change of the political and economic systems. The associations were able to handle the previously developed irrigation schemes and overcome the problem caused by separate small holdings. Common use allowed the functioning of systems. Case studies suggest the support, promotion and formation of irrigation associations. This practice may be useful, not only in the countries considered, but also in other CEE countries.

Problems, stemming from ownership and holding size change, greatly contributed to a decline in the use of irrigation schemes; these issues cannot be eliminated but their effect can be tackled by irrigation associations. It would have been more advisable to deal with the ownership and operation of irrigation schemes when privatisation took place.

Government bodies have a major role to play in irrigation structure. Main works are owned by the state in all countries. Government bodies play a key role, except in Hungary, in price setting and subsidies. In practice, a multi-level management system seems to have been established which may hinder quick and efficient progress (e.g. formation of associations). It would be worth reconsidering the institutional system and hierarchy of irrigation activity.

It is essential to solve the problem of capital shortage faced by farmers. Capital shortage in agriculture, especially for small-scale producers, is a typical feature in all countries considered. Co-operation within an association can only partially solve this problem and the real solution would be the creation of adequate credit conditions and securities. It is a problem to be solved in all countries considered. Evidence of this can be found in the case studies prepared, all of which analyse activities carried out by a number of associated farms. Country experts consider the widespread introduction of some form of association as an important element in developing irrigation activity. As the case studies demonstrate, effective irrigation activity can be carried on, even now, in this way. Average yields for irrigated crops are considerably higher than the national averages. The purpose of the various forms of association may be irrigation only (Bulgaria, Romania) or the farming activity as a whole (Slovakia, Hungary). There are successful models, highlighting that there are forms of farming which may provide a solution to the problem of irrigation. One possible economic incentive may thus be supporting the formation of farming communities, which are able to use and operate irrigation schemes.

5. SUMMARY

- A downturn in irrigation activity can be observed in all selected countries.
- Causes of this downturn include inter alia a rise in water charges; this, however, is not the most significant factor to make the greatest contribution to the decline in irrigation.
- From country and case studies, one can conclude that irrigation activity can be considered economically efficient and effective where farmers, who own land, are organised into an association or business, who then operate a particular irrigation scheme.

- The raw water price does not represent a major share of irrigation costs (e.g. 20 percent in Hungary, 25-30 percent in Slovakia).
- Irrigation charges vary widely among CEE countries. As far as irrigation is concerned, the state has a strong role in establishing the price of irrigation water in all countries considered, except Hungary and Bulgaria (WUAs, private sector).
- Some sort of incentive support exists in the countries studied.

In conclusion, together with the establishment of adequate farming conditions, the improvement of the water pricing system and the fixing of prices that cover costs may have an important role to play in irrigation development.

REFERENCES

Agricultural Water Management Policies in Selected Countries, (Bulgaria, Hungary, Romania and Slovakia). National reports (country reports and case studies). **Bulgaria** Galia Bardarska, Bulgarian Academy of Sciences, Violina Hadjieva, Institute of Economic Agriculture; **Hungary** Dr. Judit Rákosi, ÖKO Inc., György Zsikla, ÖKO Inc.; **Romania** Mihaela Popovici, Center for Environmentally Sustainable Economic Policy; **Slovakia** Emilia Kunikova, VUVH Bratislava.

Water Pricing in Selected Accession Countries to the European Union: Current Policies and Trends. The report was produced for the European Commission DG Environment.

Summary of water pricing policies in Croatia[1]

Zeljo Ostojic and Mojca Lusic, State Water Directorate, Croatia

1. ADMINISTRATION OF WATER SERVICE

1.1 Governmental administration bodies

In the Croatian water sector, administration bodies are organized by the Act on Organization and Scope of Ministries and other Government Administration Bodies (NN 48/99 and 15/00). The Act defines their range of influence and responsibilities. The Ministries and State Directorates exercising direct influence on water pricing policy through regulations proposed to the Croatian government are, as follows:

The State Water Directorate, which is responsible for all activities related to water management and the water management system:

- The monitoring of watermanagement development and its harmonisation with the requirements of overall economic development;
- The regulation of watercourses and other water bodies, protection from floods, ice, erosion and torrents;
- Hydroamelioration, irrigation and drainage;
- The management and use of the water-related estate;
- The protection of water and sea from pollution by land, the supply of communities with drinking water and industry with water appropriate to its needs;
- The use of water power;
- The planning and co-ordination of the development and construction of public water supply systems and wastewater disposal systems on a national level;
- The inspection of water pollution controls and water use, and the protection of water.

The State Water Directorate proposes the level of water use charges and the pollution tariff.

The Ministry of Public Works is in charge of activities related to the application of economic policy in construction, housing and housing policy, and the implementation of special programs for the improvement of municipal services.

The Ministry of Environment and Physical Development carries out administrative and other tasks related to the general policy of environmental protection, seeking to provide conditions for sustainable development through the integrated

1. This paper is based on a study funded by the REC. For more information on the result of the study, please contact Stefan Speck, Tel: (36-26) 505-056, Fax: (36-26) 311-294, E-mail: sspeck@rec.org.

protection of air, water, sea, flora and fauna. In addition to the above mentioned Ministries, the administrations of the 21 counties and of the City of Zagreb influence the price of water by their decisions at a local level.

1.2 Agencies and companies carrying out water management and municipal activities

1.2.1 Agency for water management activities

Hrvatske vode is the government agency for water management. The task of Hrvatske vode is to ensure the permanent and unimpeded delivery of public services and the accomplishment of other strategic tasks in water management, subject to the availability of funds provided for the purpose under corresponding legislation. Within its legal remit, Hrvatske vode passes administrative and other acts and decides on issues important to water management, such as:

- The drawing-up of basic plans for water management;
- The maintenance of water-related structures;
- Water protection;
- Water use;
- Water pollution control;
- The management of the water related estate;
- The provision of know-how in management and engineering for the construction of water-related structures and the collection of funds for financing its works and activities.

The seat of Hrvatske vode is in Zagreb, and there are five water management departments: in Zagreb, for the Sava river basin; in Osijek for the Drava and Danube river basin; in Rijeka for the Istrian and Littoral basin; in Split for the Dalmatian basin; and in Zagreb for the catchment area of the City of Zagreb.

1.2.2.Companies carrying out municipal activities

The Municipal Services Act (NN 36/95) defines municipal activities. These services include water supply and wastewater treatment and disposal, among others. Municipal services may be performed by:

- A company, founded by one or more local administration units;
- A public institution, founded by a local administrative unit;
- A service plant, established by one or more local administration units;
- A legal entity or a person, subject to a concession agreement.

Currently, services are mostly provided by companies, about 130 in number, located in larger urban areas. The law stipulates the provision of funds from various sources, but in the case of water supply and wastewater disposal and treatment, the costs are returned by the price of the service.

The firm providing the service determines the price and method of payment. In practice, this price is still controlled by the founder of the company.

2. LEGISLATIVE BASIS OF THE ECONOMIC INSTRUMENTS

The regulations influencing the price of water are, as follows:

- Municipal Services Act (NN 36/95);
- Decree on municipal service price determined by the assembly of the municipal company, and other decisions of the company regarding development of municipal infrastructure and its financial situation;
- Water Management Financing Act (NN 107/95, 19/96 and 88/98);
- Ordinance on the Level of the Water User Charge (NN 62/00);
- Regulations on Accounting and Payment of Water User Charge (NN 94/98);
- Ordinance on the Level of the Water Protection Charge (NN 58/00);
- Regulations on Accounting and Payment of the Water Protection Charge (NN 62/00);
- Decree on Conditions and Procedures for the Awarding of Concessions in Water and the Water-Related Estate (NN 99/96).

Other important laws that may directly influence the price of water are:

- The Islands Act (NN 34/99);
- Investment Promotion Act (NN 73/00).

The above laws provide certain supports for the financing of infrastructure, which results in lower loan repayments and, thus, directly affects the price of water.

The Program of Sustainable Development is prepared in accordance with the Islands Act. This Program makes soft loans available to the islands; in addition, the government prepares national programs of development for the islands, which tackle water supply and the disposal of island wastewater, among other issues.

The Investments Promotion Act extends tax and customs privileges to newly established companies carrying out specific activities, such as new companies holding the concession rights for municipal service activities.

Also, the program of reconstruction of areas of particular concern facilitates favorable investments in infrastructure, which may influence the final price of water in such areas.

3. BASIC ECONOMIC REGULATORS (HOUSEHOLD TARIFF STRUCTURES)

The basic economic regulators influencing the price of water are, as follows:

Price of municipal service

Source of revenue for municipal service fixed by the Municipal Services Act (financing the service, repayment of loans for construction of facilities and municipal infrastructure). It is determined by the provider of the municipal service, with the consent of the founder of the municipal company; paid by legal entities and persons using the municipal service.

Water use charge

Source of revenue for the finance of water management described by the Water Management Financing Act (NN 107/95). The charge is fixed by the Croatian Government and paid by legal entities and persons that abstract or pump water from watercourses, lakes, storage reservoirs, ground aquifers and other natural sources.

Water protection charge

Source of revenue for financing water management defined by the Water Management Financing Act (NN 107/95). The charge is fixed by the Croatian government and paid by legal entities and persons that discharge wastewater or other substances that pollute water.

Concessions on water and water estate

The concession provides the right of use of water and water-related estate, i.e. the right to use water and water-related estate for economic and other purposes; paid by concessionaires for:

- Water abstraction for public water supply;
- Use of water power for the generation of electric energy;
- Water abstraction for use in industrial and similar activities;
- Pumping of mineral and thermal waters, water abstraction for irrigation;
- Fish farming.

4. ORGANISATION OF PAYMENT OF WATER SERVICE CHARGES

The price of the municipal service is paid to the service provider on the basis of monthly bills.

The water user charge is set by Hrvatske vode for one year or shorter, as stipulated by the regulations. Hrvatske vode charges the bodies abstracting water directly from natural sources. Water suppliers, supplying water to consumers through public water supply systems, collect the charge and send it to Hrvatske vode.

The water protection (pollution) charge is set by Hrvatske vode for one year or less, as stipulated by the regulations. Hrvatske vode collects the water protection charge from companies discharging industrial wastewater, for which the level of pollution is measured. The water supplier collects the water protection charge and transfers it to Hrvatske vode.

The concession charge is fixed by the specific concession agreement. The concession agreement is concluded with either the State Water Directorate or Hrvatske vode, depending on who made the decision on awarding the concession (parliament, government institutions, the State Water Directorate or the county authorities). If the concession agreement is concluded by the State Water Directorate (based on a decision made by parliament, government or the State Water Directorate), the agreed amount of the concession charge is paid in favour of the government budget. If the concession agreement is concluded by Hrvatske

vode (based on the decision by the county authorities), the charge is paid in favour of the county budget.

5. HOUSEHOLD WATER PRICING

Domestic water consumption has decreased in the last eight years. According to a report of Hrvatske vode, the average price of the total household tariff in Croatia is HRK 4.88 per cubic meter (m^3) or approximately USD 0.57 (exchange rate, USD 1 is HRK 8.4535). The spread extends from HRK 2.44/m^3 to HRK 6.94 or, approximately, USD 0.28 to 0.82.

6. INDUSTRIAL WATER PRICING

6.1 Direct supply via own intake

Industrial tariff structures include water management charges and the concession charge. In general, they are estimated by Hrvatske vode for each specific concession contract and paid on the basis of the volume of the abstracted water.

6.2 Supply via public water supply system

According to a report of Hrvatske vode, the average price for the total industrial tariff is HRK 7.69 or approximately USD 0.91/m^3. The range extends from HRK 4.89 to 11.88 or, USD 0.58 to 1.4/m^3.

7. THE LEVEL OF COST RECOVERY

In general, the revenues of water and sewerage services do not fully recover the costs of these activities.

Larger-scale activities are usually financed by local government and, in some cases, by central government. There is a great difference between the existing pollution charge tariff and the real cost of cleaning the polluted water, which is estimated to be four times higher than the existing tariff.

Household use of water is subsidised: the water price for industry is higher than that for domestic consumption. Now, due to the worsening economic situation there is a relative increase in domestic consumption and a reduction in industrial consumption which causes a drop in the income of municipalities; this is one reason why the present situation is worse than before.

8. GENERAL TRENDS IN WATER POLICY IN THE COUNTRY

The Croatian government is adjusting regulations to make them conform to EU requirements including the regulations relating to water management. Croatia has ratified numerous international conventions and participates in the implementation of EU-WFD, which is expected to be adopted by the EU Parliament

Planning in water management is carried out on the following levels: the national level, county level and on the city or local level. The purpose of planning is to provide adequate quantities of water of appropriate quality for all uses. In that sense, the Croatian Water Master Plan, which is in preparation, and the water supply plan, which forms a part of it, are elements of the wider planning of the protection of the aquatic environment, and, thus, of the environment as a

whole. The development plan includes: defining of objectives; analysis of technical and technological issues; methods of managing water supply systems; application of market principles; environmental protection; implementation schedule, and investment requirements.

It will also be necessary to review all legislation related to water management, adjust it to EU requirements and define the possible deadlines for the fulfillment of commitments towards EU as Croatia seeks EU membership. At present, the major problem in the implementation of these goals is the shortage of financial means. Also, it will be necessary, through international workshops, to educate young professionals to work in accordance with EU requirements and to open water management to new approaches, especially with regard to the environment and sustainable economic development.

REFERENCES

Water Act (NN 107/95).

Municipal Services Act (NN 36/95).

Water Management Financing Act (NN 107/95, 19/96 and 88/98).

Ordinance on the Level of Water User Charge (NN 62/00).

Regulations on Accounting and Payment of Water User Charge (NN 94/98).

Ordinance on the Level of Water Protection Charge (NN 58/00).

Regulations on Accounting and Payment of the Water Protection Charge (NN 62/00).

Decree on Conditions and Procedures for Awarding of Concessions on Water and Public Water-related Estate (NN 99/96).

Islands Act (NN 34/99).

Investment Promotion Act (NN 73/00).

Hrvatske vode Report on Water Prices in Croatia, September 1999.

The main objectives of existing water pricing policies

Gheorge Constantin represented the Romanian Water Resources Management Directorate at the Conference on Economic Instruments and Water Policies in Central and Eastern Europe held in Szentendre, September 28-29, 2000. The following information is taken from the material Mr. Constantin used during his presentation concerning water pricing policies in Romania.

THE MAIN OBJECTIVES OF WATER PRICING IN ROMANIA

Economic objectives

Actual cost recovery of the operation to maintain and develop the water management system; and efficient allocation of water resources.

Financial objectives

To make available financial resources for the water supply, flood control and water protection activities.

Social objectives

Equitable access to a safe water source and protection against floods.

Environmental objectives

Quantitative and qualitative protection of water resources and the aquatic environment, and environment and water resources conservation.

CURRENT ECONOMIC INSTRUMENTS

Current cost-recovery levels

The costs of maintenance and operation of water systems and a very small part of the construction-development cost are recovered.

Incentive effect in price

Existence of the water price implies additional production costs (for water abstraction and water discharge) which should be minimised. Complementarity of pricing and charging with other measures exists to achieve key objectives.

Economic instruments

There are penalties and fines for non-compliance with the regulations as well as allowances for better compliance; revenues from these fines are earmarked for the Romanian Water Fund. There are permits and licenses for water abstraction and water discharge. Water metering is compulsory.

Main actors

The Romanian parliament approves charges, penalties and allowances, while the Ministry of Water, Forest and Environmental Protection establishes the methodology of the water pricing system, and sets the rate for grant allowances. Other actors also involved are municipal councils, municipal water supply and wastewater treatment companies, the National Company for Land Reclamation, industrial and agricultural units and the Competition Office.

What mechanisms are in place?

Charges for the abstraction of water are levied against consumers as well as polluters. Charges are differentiated by the type of water body (inland rivers, Danube river and underground water); and by how the water is used. The following charges have been set by the government:

- Water effluent charges for discharge into the natural receivers. This charge system comprises two components, a tariff for discharges within permitted concentration levels and a penalty (over and above the tariff) for discharges above permitted concentration levels.
- Drinking water charges for water delivered in the public network.
- Sewage treatment charges for wastewater discharged into the public sewers.
- Charges for water used for irrigation.

Water prices (raw water, drinking water and sewage water) are confirmed by the Competition Office, in accordance with the Emergency Governmental Decision no.7/1998, and at levels set by the previous consumer price index published by the National Commission for Statistics. The request for price modification can be submitted by the producer (the National Company Romanian Waters) to the Competition Office when the price index increases by more than five percent.

The role of consumers

Consumers have to pay the bill. With the establishment of the basin committees, consumers will be involved in decision-making on the price of raw water.

Responsible institutions

National Company Romanian Waters is responsible for the effective implementation of water pricing policies.

Impact of prices/competition

The impact of the charge for water abstraction on the price of drinking water is very small. The impact of the charge on competition is also negligable, when it is taken into account that this charge has been set on a national level. The impact of user charges for drinking water and wastewater is higher and varies according to geographical area.

PRICING POLICIES

Past trends in pricing policies

Abstraction of water was not subject to any charge before 1989. User charges levied on drinking water, sewage and irrigation were very low. The situation changed with the governmental decision 1001/1990 concerning the establishment of a unitary system for water management products and services.

Key factors determining past changes in pricing policies

Political and economic changes have been key determinants of pricing policy change. This shift has been contextualised by the transition to a market economy,

changes in financial policy and subsidies reduction. Other factors influencing a shift in policy include new environmental and water management policies, privatisation and public-private partnership. There has also been an increase in local authority responsibility.

Problems associated with past changes in water prices

Widespread poverty and economic crisis have resulted in a huge decrease in the consumption of water. Consumers are reluctant to pay for what they perceive as a 'free good'; this is combined with a weak system for billing and a low collection of payments. Meanwhile, maintenance and operation of the existing water infrastructure, (mainly flood control works and monitoring), is extremely expensive; infrastructure and water-use technologies are old.

FUTURE REFORMS IN WATER MANAGEMENT

Privatisation or partnership (public-private) in water services will be the major change in water management over the coming years. Implementation will be contextualised by: European integration in the field of environmental protection; future changes in environmental and water management legislation; the necessity to reduce subsidies and reduce pressure on the state budget; our ability to rehabilitate existing infrastructure; pressure to provide a good financial environment for foreign investments; the necessity to increase the quality of water, and the service provided by the industry.

Limiting factors

There are huge costs involved in compliance with the EU water directives. Any future changes in the ownership of the water industry and/or its pricing policy will take place in the context of the structural crisis of the Romanian economy. There is a significant lack of financial resources to implement changes, to rehabilitate decaying infrastructure or to subsidise water consumpion strategically. We expect a further decrease in water usage.

Proposals

A new pricing system is proposed based on two pricing components: one component will be set at the national level, the other river basin specific. There will also be a new tax levied on households protected from floods. The collection system needs to be improved. Financial support is essential, and will be sought from the European Union (ISPA, SAPARD, etc.).

Impacts of Bulgarian 'Law for the Waters' on water pricing policy

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INTRODUCTION

The new Law for the Waters was approved by the 39th National Assembly on July 13, 1999, and entered into force on January 28, 2000 replacing the old Law for the Waters of 1969. The waters in Bulgaria shall be managed as a common, national, and indivisible natural resource; individual river basins are to be managed in an integrated way. Public interest requires cooperation at all levels of the water system; between state administration, municipal administration, water users and environmental organizations. Ownership changes of the water works and the application of other economic regulators, affecting the use and the protection of the waters, could develop the existing pricing policy.

This paper focuses on Bulgaria's new approaches to water pricing and obstacles encountered in their application.

INSTITUTIONS

Bulgarian waters are managed both at the national level (Council of Ministers, and Ministry of the Environment and Water) and at the river basin level (river basin directorates at the Ministry of the Environment and Water, and river basin councils), (State Gazette, Vol. 67, July 27, 1999). The four river basin directorates and the river basin councils have not yet been established.

The Ministry of Regional Development and Public Works (MRDPW) is the main institution responsible for most of the water supply systems and sewerage facilities in Bulgaria. Forty-eight water supply and sewerage companies provide services for 8,268,171 inhabitants. Thirteen of the companies are entirely state-owned through the MRDPW, nineteen are wholly in municipal ownership, and 16 are in joint state and municipal ownership with the state holding a 51 percent controlling interest. In case of wastewater discharge to the public sewerage system, water supply and sewerage companies can launch a lawsuit.

As regards irrigation, there are 23 regional branch offices of the Irrigation System Company (ISC), which is part of the Ministry of Agriculture and Forestry, that report to a central office in matters of policy and financial control. The ISCs are responsible for the management, operation and maintenance of the 600,000 hectare (ha) state-owned irrigation area and the 130,000 ha of drainage systems, as well as providing flood protection to 164,000 ha, mainly along the Danube. They have made a significant effort in recent years to promote irrigation water users associations (IWUAs), in an effort to group larger numbers of small farmers into more effective units. In 1999, there were 176 IWUAs in a 100,000 ha area. The

TABLE 1

Breakdown of responsibility in the water pricing process

Area	*Establishment of regulation*	*Implementation*	*Collection*	*Receiving body*
Calculation of the prices for water and wastewater services	Municipal councils and regional water supply and sewerage companies (operators); regional water supply and sewerage companies (100% state ownership); regional irrigation systems companies and irrigation water users associations	Regional water supply and sewerage companies (operators); regional irrigation systems companies and irrigation water users associations	As with implementation	As with implementation
Issuing of permits	Council of Ministers, Ministry of Environment and Water (MoEW), Director of River Basin Directorate, Ministry of Defense and the Ministry of Transport	MoEW and river basin directorates	MoEW and river basin directorates	National Environmental Protection Fund
Calculation of the abstraction fees (unit rate)	Council of Ministers, Ministry of Environment and Water (MoEW), by January 1, 2001	As above	MoEW and river basin directorates and municipalities	As above
Calculation of the discharge fees (unit rate)	Executive Agency of Environment at the Ministry of Environment and Water	As above	As above	70% National Environmental Protection Fund; 30% Municipal Environmental Protection Fund
Calculation of penalties	Ministry of Environment and Water (MoEW)	As above	As above	State budget

development and creation of new legislation for the establishment and promotion of IWUAs is needed.

The division of responsibility in the water pricing process is shown in Table 1. We can see that the Ministry of the Environment and Water (MoEW) decides the fees and penalties for abstraction and discharge. Penalties are paid for the pollution of water. In the case of direct water discharge, the 15 regional inspectorates at the Ministry of the Environment and Water, or the Minister, can launch a lawsuit against a person or organization. Rivers in Bulgaria are categorized according to the volume of river water, measured in 1967, with minor amendments introduced in 1985. Both the categorization of rivers (only three categories) and the values of their quality indicators differ from EU requirements. New regulations for a different categorization of rivers in the updated Law for the Waters will be necessary.

WATER PRICING POLICY

Up to now, water supply and sewerage companies and ISCs have relied on subsidies from state sources in order to cover their running-costs. The new Law for the Waters introduced the principle of full cost recovery (Article 193. 1). The price of water supply, collection and treatment is to cover the costs of the construction, operation, maintenance and reconstruction of the installations and the systems necessary for the provision of the respective services (State Gazette, Vol. 67, July 27, 1999). This revenue will not be enough, however, to finance the development of the sustainability of water resources.

At present, the water price levels do not recover the capital costs: the maximum range of the price of the drinking water has been set on the basis of the recovery of the full costs of the production and sale of one cubic meter of water. The average water charge represents 0.95-1.04 percent of average household income and 1.13-1.25 percent of average household expenditure.

The low price of irrigation water led to the waste of an enormous volume of water. By 1992, water pricing reform in irrigation had been introduced. The basic principles of water pricing for irrigation are as follows:

- A water pricing system for irrigation which ensures the continued use of the irrigation systems;
- A water pricing system for irrigation which takes into account the different sources of the irrigation water, gravity feed or pumping;
- Equality of rights among the water users.

A new element of water pricing is the fee for water abstraction, which will be charged from January 1, 2001 (State Gazette, Vol. 65, August 8, 2000). The calculation of the fee for water abstraction is as follows :

$$T = ExWxK \quad (1).$$

T is the value of the fee, BGL/year;
E is the tariff, BGL/m^3 (Table 2);
W is the volume of water abstraction per year, m^3/year;
K is the correction coefficient according to the category of the abstraction's source (Table 2).

No fees are paid for fire-fighting needs; nor for water use below 0.2 litres per second (l/s) and not exceeding 10 cubic meters (m^3) per day; nor for the irrigation of individual farms smaller than 0.2 ha, using surface water drawn from the property, provided the volume of water is less than 300 m^3 monthly. In the absence of sufficient controls, landowners' wells can be big competitors with the water supply systems.

The two- to threefold decrease in water consumption during the transition period can be explained not only by the economic collapse and water price increase but also by the liberalization of property laws: Article 23 states that the owner of the land is the owner of the waters and the water-related estate on the property unless they are the property of the state or municipality; and Article 24

defines private property as including:

1. Waters springing on the property, except mineral water, that are not part of water supply systems;
2. Lakes, which are not fed by state or municipal waters, or which do not flow through state or municipal waters;
3. Precipitation waters collected within the boundaries of the property and the facilities constructed for that purpose,
4. Waters flowing out of items (1), (2) and (3), up to their inflow point into state or municipal waters;
5. The beds of the waters of items (1), (2), (3) and (4);
6. Wells on property;
7. The facilities and systems for the use, transport and treatment of the waters which serve the property, as well as the facilities for prevention and treatment of damage to water (State Gazette, Vol. 67, July 27, 1999).

Additional revenues are needed to ensure the sustainable use of water resources by different water suppliers and users.

ECONOMIC REGULATION

The new economic regulations for the use, protection and development of water and the water-related estate are designed to serve the following goals:

- The availability of adequate supplies of water and mineral water for drinking, medical purposes, recreation and countless other activities is of vital importance and should be protected;
- Payment should be calculated on the basis of the volume and the quality of the used and discharged waters;
- The pollution or other damage of waters and the water-related estate, or their disruption, should be fined;
- Economic incentives should promote the rational use, protection and restoration of the waters and water-related estate.

There is a lack of accurate values for the actual consumption of water by subscribers. Limiting the total water losses from the mains to 25 percent could also be a big problem. For instance, asbestos-cement pipes, of diameter 80-500 mm and a total length of 12,236 km, supplying 20,190 habitants, produced water losses of 20 percent to 49 percent of the supplied water (from 45 to 179 m^3/d.km) with a pressure variation of 0.2 to 0.68 Mpa. Steel pipes, of diameter 80-2000 mm and length 2,200 m, covering a region with 2,885 habitants, produce water losses of 14.5-43 percent of the total water consumption (29-130 m^3/d.km) with a pressure variation of 0.04 to 0.6 MPa (Dimitrov G. et al. 1996).

TABLE 2

Breakdown of responsibility in the water pricing process

Prices in Bulgarian leva (BGL). EUR 1=BGL 2

	Type of water users	Tariff E BGL/m³	Tariff E EUR/m³	CORRECTION COEFFICIENT K Category I	Category II	Category III
1.	**Water for households**	0.02	0.01	1	0.5	0.3
2.	**Water for irrigation**	-	-	-	-	-
2.1	Water from surface waters*	0.001	0.0005	5	1.5	1
2.2	Water from ground waters**	0.005	0.0025	5	1.5	1
3.	**Cooling water**	0.0001	0.0025	5	1.5	1
4.	**Water for recreation**	0.04	0.02	1	0.5	0.3
5.	**Water for industry**	0.008	0.004	5	1.5	1
6.	**Water for other uses**	0.01	0.005	5	3	2

* The categorisation of the flowing surface waters is on the base of Regulation 7 (State Gazette, Vol.96, August 8, 1996).

** The categorisation of the ground waters is on the base of Regulation 1 (State Gazette, Vol. 57, 2000).

TABLE 3

Forecast of the needed costs for water sector according to EC directives

EUR million (Phare 1999)

Directive	Scenario	COSTS Capital		EQUIVALENT ANNUAL COST	
UWWTD 91/271/EEC	High cost	2,360	98	225	211
	Baseline	1,750	78	172	161
	Low cost	1,130	61	121	115
DWD 80/778/EEC	-	135	2	9	8
Total	**High cost**	**2,495**	**100**	**234**	**219**
Total	**Baseline**	**1,885**	**80**	**181**	**169**
Total	**Low cost**	**1,265**	**63**	**130**	**121**

Note: Equivalent annual costs include the full operating costs and do not allow for a slow build up of additional operating costs.

Moreover, the quality of used and discharged waters does not correspond very often to the EU directives. In 1997, only 43 percent of the total amount (1.152 billion cubic meters) of wastewater was in correspondence with Directive 91/271/EEC. The projected costs for the harmonization of the water sector with the EU are shown in Table 3 (PHARE 1999).

There are 36 priority wastewater treatment plants in the National Development Plan of Bulgaria for the period 2000-2006. The capital cost of the building of the plants which will serve more than 10,000 inhabitants is approximately BGL 1.52 trillion (EUR 7.6 billion), (Ministry of Environment and Water 1999).

It is evident that there is a need for significant investment. One possibility is privatization (Article 6). The waters, the water sites and the water systems and facilities may be owned by the state, the municipalities, individuals and corporate bodies

(State Gazette, Vol. 67, July 27, 1999). Concessions for the use of water, the water-related estate and the existing publicly-owned systems and facilities connected with them shall be granted; concessions will also be granted for the construction of new hydro-technical, hydro-energy, irrigation, water supply and sewerage systems. The payment for the right to use waters, which are exclusive state property and the water-related estate, which is public property, shall include the fee for registration and for the concession. The conditions of the concession are defined in the concession contract.

The 'polluter pays' principle has been mentioned but the economic situation for the rational use, protection and restoration of the waters and the water related estate still does not exist.

PROPOSED SOLUTIONS

Bulgaria's accession to the EC could have a very serious impact on the water sector. Some of the very urgent activities are as follows:

- Establishment of a new national water pricing policy according to the EU Water Framework Directive;
- Fundamental revision of former investment practices (the construction of over-sized water works and expensive water facilities not used on a permanent basis);
- Implementation of cost-effective and environmentally-friendly technical solutions for water treatment;
- Users', consumers' and stakeholders' participation in water management decisions as well as in the water pricing process at local level — river basin councils, water users associations, water clubs managed through global water partnership etc.

This process will be facilitated if there are European guidelines for economic analysis and for integrated water resource management plans. A European directive for water quantity measuring is also needed. The process will be further eased if the documents are translated into the national languages of the EC Accession Countries.

REFERENCES

Dimitrov, G., Trichkov, I., (1996), *Determination of Water Losses in the Urbanized Area Water Supply Networks by Experiments*, Vodno delo, 3/4, 26-29.

Ministry of Environment and Water, (1999), *National Program for Priority Construction of Urban Waste Water Treatment Plants for Populated Areas with over 10,000 Equivalent Inhabitants in the Republic of Bulgaria.* Summary, pp. 26.

PHARE, (1999), *Provision of Technical Assistance in the Approximation of Water Legislation for Bulgaria.* Contract No: 96-0863.00. BUL-110 Interim Report 1, March, pp. 97.

Water pricing in Estonia

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GENERAL OVERVIEW

In Estonia, the total volume of freshwater available is about 800 cubic meters (m^3) per capita/year, which is an average value compared to other European countries. Water is abstracted for different purposes: public supply; industrial production; and agricultural and mining activities. It is abstracted from rivers and lakes and from different groundwater levels. The amount of water abstraction and consumption has changed in recent years: the decrease of industrial and agricultural production has caused a drastic reduction in water use; higher prices and more accurate measurement of water usage acted as an incentive on industry and the population to save water. In 1998, water extraction was 1155 m^3/capita. Domestic water use has reduced tenfold to 110 m^3/capita/year; water use in the mining, energy and fish farming sectors remains high.

Water consumption in Estonia in 1999:

- Cooling water for power plants, 80 percent;
- Mine and open cast drainage water, 10 percent;
- Water for domestic and industrial purposes, 3-5 percent;
- Agriculture, 0.3-1.2 percent;
- Fish farming water, 5-7 percent.

Public water use by domestic and industrial consumers is to be paid for. Companies that have their own well pay only a water abstraction charge.

Availability of central water supplies to the population

The central water supply system exists in all towns and in the majority of small settlements. Nevertheless, not everybody uses the central water systems. Central water supply covers 80-94 percent of the population in bigger towns and 59 percent on average in rural settlements. Approximately 77 percent of the population of Estonia is connected to the central water supply systems. Surface water is purified and disinfected before use. Groundwater is usually used without treatment. There are 23 water treatment plants in Estonia. In bigger settlements, 80-95 percent of the population is connected to the centralised water systems.

The total length of the water supply network is about 3100 km, of which 25 percent is found in Tallinn. The pipes are made of steel and cast iron. Leakage is relatively high, in some places up to 60 percent, due to the poor state of the water supply systems. The mean age of pipes is about 30, of which 10 percent are older

TABLE 1

Water tariffs as percentage of household income in Tallinn, Estonia

Size and income level of household	*Average income and size of household*	*Low income, average size household*	*Large family, average income household*
Average monthly income	EEK 450	EEK 1164	EEK 5540
Average household size	2.3 persons	2.3 persons	5.0 persons
Average water consumption	6.9 m^3/month	6.9 m^3/month	15 m^3/month
Water tariff	EEK 15/m^3	EEK 15/m^3	EEK 15/m^3
Average water and sewerage bill	EEK 103.5	EEK 103.5	EEK 225
Percentage of monthly income	2.2%	9%	4%

than 60. The oldest ones, in Tallinn, date from the 1880s. Twenty-five percent of the pipes need immediate reconstruction.

Central sewage systems

The central sewage system is available to approximately 77 percent of the population in Estonia. In towns with over 5000 inhabitants, this figure grows to 87 percent. Nevertheless, 60 percent of the sewage system is technically amortised and wastewater leakage occurs frequently. At many settlements the rate of central sewage treatment is low and wastewater can leak into the ground. This wastewater leakage represents a serious danger to the upper ground water layers in some areas.

WATER PRICING

The objectives of water pricing policy are:

- Economic, to create the economic preconditions necessary to follow the EU water and waste water quality requirements;
- Financial, very large investments will be required in new infrastructures for water and the protection of water;
- Social, prices must take into account people's ability to pay;
- Environmental, encouragement of sustainable water consumption, the following of environmental norms.

The current policy for water management, in Estonia, is a system balanced between the use of command and control (emission standards, permits for water use and discharge, State Inspection) and economic instruments (water abstraction and pollution charges, threshold levels, differential charge rates, fines, subsidies, grants and soft loans). All ground and surface water use, both abstraction and discharge, requires a permit from the Ministry of the Environment. This permit specifies the water rights of the user: every town, settlement or enterprise using more than 30 m^3 of surface water or more than 5 m^3/day of groundwater must have a water use and wastewater discharge permit. More than 1200 water permits were issued to enterprises in 1999.

Mechanisms are, in general, in place. From the year 2000, the Act on Water Supply and Sewage has regulated the main relations between state, municipalities, water companies and customers as well as setting in place the main regulations for water price control. The municipalities have various systems of charging, usually combining water and wastewater services.

Costs to industry, households or individuals for water have traditionally been low in Estonia.

The dramatic increase of water prices during the last five years has been a result of the complete or partial cut of state and municipal subsidies. The average prices increased from between three to nine and a half fold. This gave rise to the remarkable decrease in water consumption.

Limiting factors on water price formation are:

- Need for investments and cost recovery;
- Specific character costs of water management companies;
- Ability to pay;
- Firm conviction and support of the local politicians in power;
- Traditions of practice and public opinion.

Constant costs are the major budgetary expense of water management companies, at about 80 percent. Variable costs, related to the amounts of water consumed and wastewater treated, form only 20 percent of the total expenses. This means that the drastic decrease in water consumption affects the level of water prices remarkably.

ABILITY TO PAY

Ability to pay is an important limiting factor in implementing a 'polluter pays' policy. National statistics show that a relatively high part, 45 percent, of average household incomes is spent on food and a further 20 percent for housing related expenses. This is similar to the situation in other countries in transition. For the poorest sections of the population (generally defined as the first and second percentile of income distribution) the proportions spent on essentials such as food, rent and heating are significantly higher than average. Following a number of studies on affordability, we assume that poor people will be able to afford to spend no more than four percent of income on water, sewage and other environmental charges (i.e. solid waste collection). Affordability studies show that people will cut down on their consumption to what could be considered a bare minimum.

At current income levels, the Tallinn water tariffs are already too high for low-income households (see Table 1). The water tariffs are not acceptable for average income households either, according to Western European standards.

On the basis of national income data for 1997, an average household on average income would be paying 2.2 percent of its income for water and sewerage; an average household in the poorest 10 percent of income distribution

would be paying nine percent and a large (five person) family on average income would be paying four percent. The figures refer to an assumed average water consumption of 100 litres per person/day.

Water tariffs and income levels differ considerably across Estonia. Income levels in other towns and settlements are 40 percent lower than in Tallinn. Water tariffs reflect this situation. The water tariffs vary from EEK 4 to more than EEK 21. Prices for legal persons are twice as high, as a rule.

In conclusion, Estonian water prices are already unaffordable for poor households and people on average incomes with large families. Consequently, it will be very difficult to increase the water charges further, to full cost recovery levels, as this would mean a relatively sharp increase in these charges, all across Estonia.

THE APPLICATION OF THE FULL COST RECOVERY PRINCIPLE

The application of the full cost recovery principle would lead to annual water sector charges of EUR 62 per person per year (EEK 930). For an average household (2.3 persons), this would result in monthly costs for water supply and sewerage of approximately EEK 390, 8.3 percent of monthly income, leading to unacceptable social circumstances.

The full cost recovery principal cannot be implemented on short notice. The use of standard EU technologies for water management will lead to EU level water charges. The income level in Estonia is still considerably lower than in the EU, leading to high water prices if the full cost recovery principle were applied.

Water prices should be increased in tandem with the increase of income during the coming years. Measures to support low-income households should accompany price increases, as, otherwise, these households will pay too high a share of income for water. If economic growth is sufficiently high, water prices will reach the full cost recovery level after 10 to 15 years.

The Act on Water Supply and Sewerage anticipates that a reform of water prices will include three components:

- Water consumption;
- Fixed base water use figure;
- Connection charge.

The price shall be established such that the water company can:

- Cover production costs;
- Comply with quality and safety requirements;
- Comply with environmental protection requirements;
- Operate with justifiable profitability.

The price of the water shall not be discriminatory with regard to different clients or groups of clients.

The procedure for regulating the price of the service shall be approved by the local government council. The price shall be established by the local municipality

TABLE 2

Prices of water and wastewater

Water (W), wastewater (WW) per cubic meter. Prices in Estonian kroon (EEK). DEM 1=EEK 8

City	Population in thousands	PRICE FOR HOUSEHOLD INCLUDING VAT			PRICE FOR INDUSTRY EXCLUDING VAT			Share of industry in consumption/ discharge
		W	WW	Total	W	WW	Total	
Tallinn	411.6	8.3	6.7	15	17.05	12.7	29.75	24/27
Tartu	100.6	6.3	9.23	15.53	6.52	9.56	16.08	27/33
Narva	73.8	4.07	5.36	9.43	6.82	9.16	15.98	49/42
Pärnu	51.4	5.6	7.6	13.2	6.74	9.96	16.7	32/41
Viljandi	21.7	5.5	6.01	11.51	9.0	8.03	17.03	25/46
Haapsalu	13.6	7.2	15.3	22.5	6.1	12.97	19.07	28/26
Paide	10.4	7.4	13.22	20.62	3.7	28.3	32.0	17/23
Keila	10.0	7.4	10.4	17.8	6.25	8.8	15.05	27/41
Tapa	8.3	5.0	5.0	10.0	4.0	14.0	18.0	25/55
Polva	7.1	4.0	10.0	18.0	4.0	14.0	18.0	25/27
Tyri	7.0	5.0	7.0	12.0	6.62	8.97	15.59	24/25
Elva	6.4	6.8	9.2	17.0	8.69	17.8	26.49	40/40
Rapla	6.3	8.0	12.0	20.0	6.78	10.17	16.95	22/68
Paldiski	3.9	6.0	3.2	9.2	11.69	7.29	18.97	21/24

and made public at least three months prior to making changes. Local government establishes prices for water, wastewater and for connection with PWS. Generally, these do not exceed four percent of the minimum income, and remain within the World Bank guidelines on water tariffs, for countries such as Estonia.

In Tallinn, Tallinn Water Company's current price covers:

- Operations;
- Approximately 35 percent of required investments;
- Repayments of loans from international banks.

Wastewater tariffs are collected together with charges for water supplies. Generally they include an element for pollution charges, paid to wastewater treatment companies for effluents discharged and for sludge disposal. Such charges are higher for industrial customers as pre-treatment is rare and wastewater discharged by industry to the sewer system tends to be combined streams (of domestic and untreated process wastewaters).

Price structure is as follows: Total water price = basic fee to cover the costs of maintenance + water and wastewater treatment costs + environmental charges + justified profit + VAT (for households).

The basic fee is the charge paid for water sold by the Public Water Company measured by water meter. Meters have been installed continuously for several years; having a water meter is more economical. At present, countrywide, more than 50 percent of PWS water consumers have water meters, while in Tallinn, more than 75 percent do.

Specific objectives for Estonian water management are:

- Provision of water services (water supply and treatment) to all households and companies in the state.
- To ensure that the costs for the provision of water services are more or less equal for all polluters in the same category. Preferably, the costs for water supply should be held within a certain range throughout Estonia. Water charges in Estonia vary at present from EEK 3 to EEK 20, which seems too wide a range.
- Organisation of water service provision through independent companies (private or municipal) making costs and incomes for these services clearly visible.
- To set as a final goal, water services provided by private companies with full cost recovery (to reach this situation a transition period is required during which the regional authorities bridge the gap between the real costs and the income from water prices).
- Development and implemention of a monitoring program providing a clear picture of all emissions, which will allow proper control, and management of water services.

Economic instruments and water pricing in the Czech Republic

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1. INTRODUCTION

Ten years after the collapse of the totalitarian system and the introduction of a market economy, the Czech Republic is already a fully transformed country which wishes to enter the European Union and for this reason is implementing the environmental *acquis* and trying to attain the limits set for macroeconomic indexes. However not everything has succeeded, there is still a lot of work. Of all the regions in the Czech Republic (NUTS 2), only Prague has attained a level of GDP that is considered average in the EU; all other regions are below this limit and should therefore be entitled to subsidies from EU structural funds for their development.

The Czech Republic is now quite successful in environmental protection and great progress in this area has been made in the past ten years.

To realise such progress, annual expenditures of about CZK 25 billion (EURO 750 million) are necessary for environmental protection. Other investment is also called for, for example, in the water management sector, especially in water protection, where much investment is needed, a fact reflected in the level of charges and prices in this sector.

2. PRICING PROBLEMS

Three forms of prices were established with the Price Act No. 526/1990 Coll.:

a) A maximum price, set by the Ministry of Finance,

b) A regulated price, which is determined by the supplier according to rules given by the Ministry of Finance,

c) Free market prices.

The Ministry of Finance is responsible for water pricing and co-operates with other ministries regarding this issue.

The Water Management Act No. 138/1973 Coll. sets out the basic principles and rules for water sector legislation, with the exception of the wastewater polluter charges, which were fixed by Act No. 58/1998 Coll., as a new economic instrument for protecting surface waters against pollution. From 2001, water-related economic instruments will be amended by a new Water Act, its draft is already in the Parliament of the Czech Republic; there will also be a new Act on Pipelines and Sewage including provisions for the pricing and administration of water charges.

Current charges in the water sector include tariffs for drinking water provision, wastewater collection and sewage treatment; river basin companies are

required to pay a tariff on surface water abstraction. All these prices are regulated, as it is necessary to have some state control in the pricing policy of this sector, owing to the presence of natural monopolies in the market.

3. PRICE REVOLUTION

The last year of the centrally planned economy was 1989. Between the years 1989 and 1999 the inflation rate was 3.691, meaning an average price growth of 269 percent, according to figures from the Czech Statistical Office.

3.1. Surface water

In 1989, the fixed price of surface water was CZK 0.46 per cubic meter (m^3) in all river basins; for steam power plants the fixed price was CZK 0.05/m^3, which was subsidised.

In 2000, the prices are regulated. The River Basin authorities calculate the tariffs for the five main River Basin regions; the value is between CZK 1.55 and 2.53 per cubic meter, which includes a profit of about 20 percent of total costs. The growth in the price index between the years 1989 and 2000 was 5.5, which is approximately 450 percent. Subsidies have been given to river basin authorities for the maintenance of waterways and the removal of flood damages.

A discount in water prices has also been given to heat/power stations.

A decreasing trend has been observed in surface water withdrawal. In 1989, the amount of water withdrawn by consumers was 2.6 billion cubic meters, while, in 1998, the amount of water withdrawn was only 1.7 billion. This means that the consumption of surface water is now almost one billion cubic meters lower (a 35 percent decrease). The reasons for this are: the decrease in energy production and the decrease of production in the metal industry; water users have also introduced water saving measures.

3.2. Drinking water supply and sewage collection

3.2.1. Drinking water

In 1989, the fixed price of water was CZK 3.70/m^3, for industry, and CZK 0.60 for households. Subsidies were at a level of about CZK two billion.

In 2000, there are about 5000 entities which supply drinking water. Of these, the 90 biggest companies are centrally monitored. The average price of drinking water is CZK 18.0/m^3 with a small difference between the price for households (CZK 17.44/m^3) and other consumers (CZK 18.96/m^3). This difference will soon be eliminated.

The growth index between the years 1989 and 2000 for other consumers is 5.12, which means a growth of 412 percent. This growth is very striking compared to the inflation rate. Many subsidies and soft loans have been given to this sector in the form of investments into wastewater treatment plants.

A decreasing trend is also observed in drinking water supply. In 1989, the total withdrawal of drinking water was 917 million cubic meters, of this, households used 523 million. In 1999, the total withdrawal was only 526 million cubic meters, of which, households took 331 million cubic meters. The total decrease in supplied drinking water is about 43 percent and for households this figure attains 37 percent. Drinking water consumption per inhabitant has decreased from about

180 litres per day to about 120 litres. This strong trend in economising on drinking water consumption is due mainly to higher prices.

3.2.2 Sewage collection

In 1989, the fixed prices were CZK 0.80/m^3 for industry, and CZK 0.20/m^3 for households.

In 2000, prices are regulated. For the 90 biggest companies, which are centrally monitored, the average price is CZK 15.11/m^3, households have a slightly lower price, CZK 14.20/m^3, while other entities pay CZK 16.16/m^3. The growth index in these prices for industry between 1989 and 2000 is 20.20, which means an increase of 1920 percent and the figure for households is 71.0, which means an unbelievable increase of 7000 percent.

In 1989, households paid CZK 0.80/m^3 for services in the water sector (supply of drinking water and sewage collection). In 2000, an average of CZK 31.60 is paid, which is approximately one EUR per cubic meter.

4. FUTURE DEVELOPMENT

In 2001, two basic pieces of legislation will come into being: the new Water Act, which will completely integrate all economic instruments in water legislation except payments for drinking water supply and sewage collection; and the new Act on Water Supply Systems and Sewage, which will cover these payments. In the Water Act, the price for surface water consumption will be established as an annual charge fixed by Government Decree; the reason for this is that the river basin authorities will change form from joint stock companies to a form of state company, in 2001. Thus, the tariff can act as an economic instrument. In this Act environmental charges for polluting surface water will also be implemented.

In the Act on Water Supply Systems and Sewage, the regulated price for drinking water supply and sewage collection remains; there is an option for a one component price or a two component price (consisting of a fixed component and a variable component relating to the volume of drinking water supplied or the amount of sewage collected).

5. CONCLUSIONS

Looking at the new water legislation, we can see that neither prices nor charges will suffice to cover the new financial requirements in the water sector relating to the implementation of the EU's environmental *acquis*. About CZK 100 billion is needed for wastewater treatment plants and wastewater pipelines, and about CZK 30 billion for drinking water supply.

The State Budget and foreign sources can cover approximately 30 percent of this. The remaining 70 percent of the money needed must be provided by commercial loans which means paying interest at current rates. So, it is possible, that the total price for implementing the environmental *acquis* of the EU may come to CZK 200 billion (EUR 5.7 billion). This is the main reason why the Czech Republic needs a delayed deadline for the full application of the environmental *acquis* in the water sector. A gradual growth of prices and charges in the water sector is therefore very probable.

Water pricing in England and Wales

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1. THE STRUCTURE OF THE WATER INDUSTRY

The structure of the water industry varies in the different parts of the United Kingdom, as follows:

- England and Wales, (connected population 52.3 million); ten privately owned water and sewerage companies and 15 water-only companies;
- Scotland, (population five million), three statutory; publicly owned water authorities;
- Northern Ireland, (population 1.7 million); single government agency (Northern Ireland Water Service).

This paper deals only with the tariff and pricing structures of the privatised water industry in England and Wales (E&W).

In England and Wales overall price limits are set, on a five yearly basis, by the economic regulator, the Office of Water Services (Ofwat). Ofwat is a non-ministerial government department, based in Birmingham, England. It is headed by the Director General of Water Services. There are ten regional Customers Service Committees (CSCs).

Annual price limits are set, for each of the privatised water companies, under a system of price-cap regulation (RPI-X). Prices are set so as to enable an efficiently

FIGURE 1

Average water and sewerage household bills in England and Wales 1989-1990 to 2000-2001

Prices in UK pounds sterling (£). Set at May 1999 levels

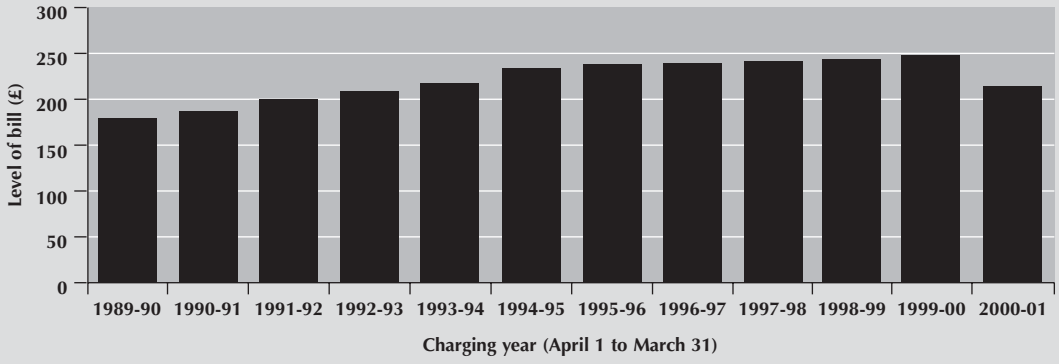


TABLE 1.A

Sample annual non-household water bills based on annual consumption of 1,000 m^3

Prices in pounds sterling (£), May 1999

Water authority	*1995-1996*	*1999-2000*	*2000-2001*
Anglian	n/a	738	655
Welsh	1,142	1,103	1,085
North West	811	801	824
Northumbrian	1,238	1,026	717
Severn Trent	818	884	819
South West	1,164	1,017	915
Southern	1,057	1,165	1,007
Thames	913	927	845
Wessex	1,120	1,165	1,047
Yorkshire	943	1,024	897
Industry average	**947**	**933**	**857**

Assumptions: 50 mm meter size; 1,000 m^3 water used.

TABLE 1.B

Sample annual non-household sewerage bills based on an annual consumption of 1,000 m^3

Prices in pounds sterling (£), May 1999

Water authority	*1995-1996*	*1999-2000*	*2000-2001*
Anglian	n/a	1,056	937
Welsh	1,120	1,208	1,103
North West	6,902	9,040	7,697
Northumbrian	6,001	7,222	4,902
Severn Trent	4,804	4,762	3,794
South West	2,447	1,991	1,582
Southern	1,398	1,602	1,436
Thames	1,108	1,151	1,009
Wessex	1,558	1,584	1,484
Yorkshire	1,042	1,087	933
Industry average	**3,111**	**3,343**	**2,758**

Assumptions: £20,000 rateable value (property value); 50 mm meter size; 1,000 m^3 water used.
All sewage is domestic strength.

run company to earn a rate of return equal to the cost of capital. The current system of price-cap regulation has been in place since 1989 (see Future Water and Sewerage Charges 2000-05, pp. 86, 87).

2. KEY FACTS ABOUT THE INDUSTRY IN ENGLAND AND WALES

- There are 20.8 million household and 1.6 million non-household connected customers.
- Ten large regional water and sewerage companies serve customers across England and Wales.
- There are fifteen local water-only companies mainly in the south and east of England.
- Turnover in 1999-2000 was GBP seven billion (45 percent water, 55 percent sewerage).
- Annual projected capital expenditure in 2000-2005, GBP 3.1 billion.
- Regulated capital value in 1999-2000, GBP 27 billion (GBP billion in 1989-90).

Note: all data is for the latest full financial year available i.e. 1999-2000. All values in May 1999 prices. Financial year runs from 1 April – 31 March.

3. THE CUSTOMER CHARGING BASE

Households

There were 20.8 million households in 1999-2000 (mid year estimate) divided for charging purposes as follows:

- 16.7 million (83 percent), receiving unmeasured supplies;
- 4.1 million (17 percent), receiving measured (metered) supplies.

Most unmeasured household customers pay water and sewerage charges related to the value of the property receiving a supply (rateable value based charges).

All newly built properties (with very few exceptions) since 1990 receive a metered supply. From 1 April 2000 all customers in England and Wales may opt for a meter free of initial charge. Most companies require customers with swimming pools and garden sprinklers to be metered.

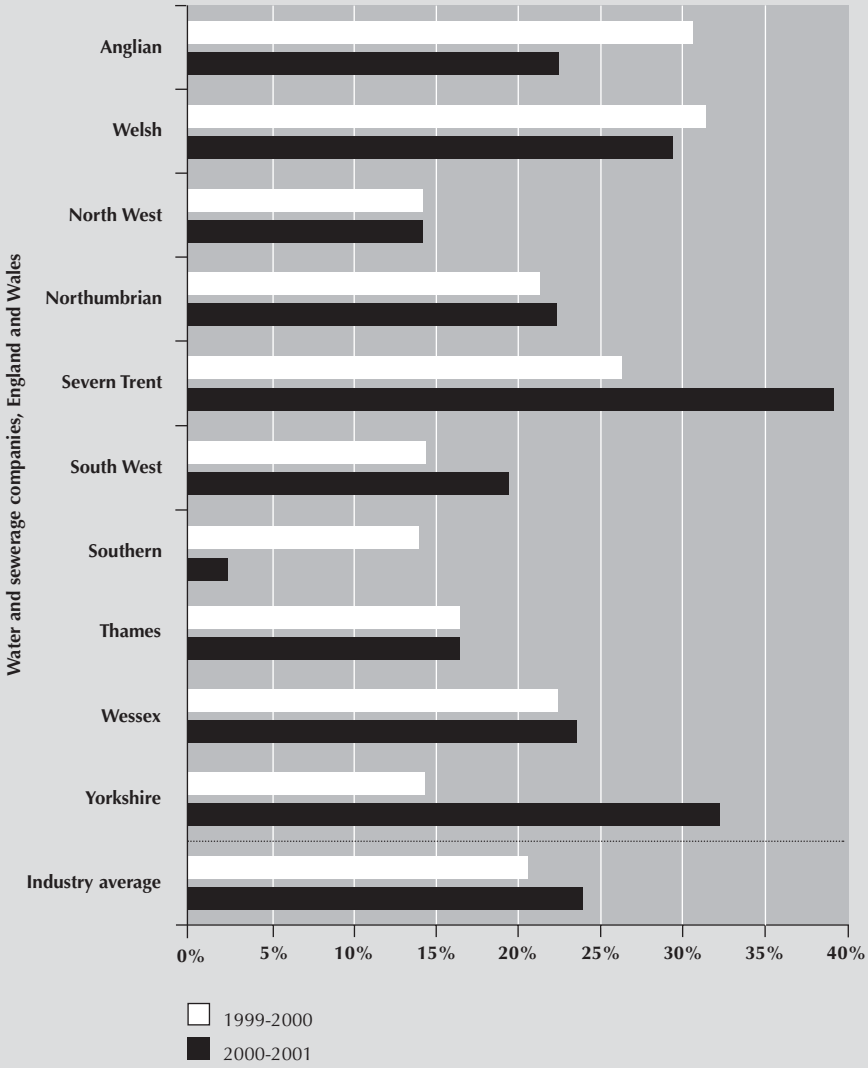
The annual rate of tariff switching from unmeasured to measured (metered) supplies is currently around two percent. The proportion of water customers taking metered supplies by company area varies from over 40 percent in the east of England to five to ten percent in the north and north-west.

Non-households

The large majority of non-household customers are metered (on average, 86 percent in 1999-2000). The proportion varies from over 90 percent in the Anglian Water and Severn Trent Water areas to 65 percent in the Northumbrian Water area.

FIGURE 2

Large user tariffs: percentage of bill saving over standard volumetric tariff for customers using 300 ml/annum



All unmeasured non-households pay water and sewerage charges related to the value of the property (rateable value). Most companies have programmes to complete the metering of non-households over the next five years,

4. ANNUAL TARIFF SETTING

Tariffs for households and non-households are set on a decentralised company basis in England and Wales as follows:

1. Each of the companies sets its tariffs on an annual basis at levels that do not exceed, on an average charges basis, the annual price limit set by Ofwat for the company.
2. These tariffs are then subject to approval on an individual charge basis by Ofwat, having regard to any guidance that may be issued by the Secretary of State for the Environment for charges in England and the Welsh Assembly for charges in Wales.
3. Following approval by Ofwat each company is obliged to publish on 1 April each year an annual charges scheme setting out the individual tariffs and the charging principles it will apply for that year (1 April – 31 March).

5. PRICING PRINCIPLES FOLLOWED BY THE REGULATOR (OFWAT)

The broad principles followed by Ofwat when regulating tariffs in England and Wales were set out in Paying for Water (1991) and in a letter to the companies in 1999 (MD 152). These can be summarised as follows:

- Prices to be related to costs (i.e. tariffs should be broadly cost reflective);
- Prices to give incentives to sensible use (i.e. tariffs should encourage efficiency of use);
- Price structures to be transparent and easy to understand (i.e. tariff structures should send clear signals to users).

In addition, tariffs should be structured so as to give protection where practicable to vulnerable customers. This should relate both to tariff structures (as in general support for regional averaging of charges) and to methods of payment (i.e. free cash payments).

6. MEASURED TARIFF STRUCTURES

Households

Typically, household measured tariffs consist of a two-part structure:

- A standing charge, set to recover customer-related costs; and
- A volumetric rate, set to recover the balance of operating and capital costs.

In the current year, 2000-01, the average combined standing charge was GBP 47 or 25 percent of the average water and sewerage measured bill of GBP 189. Typically, the standing charge will include an allowance for surface (and high-

way) drainage costs. Typical volumetric rates will vary between GBP 0.55 and 0.85 per cubic meter (m^3).

Non-households

The typical non-household measured water and sewerage tariff has a similar two-part structure to that for households (see above).

In the case of non-households the standing charge will vary according to meter size (25 mm, 50 mm etc). The volumetric rate will generally be set at the same level as for measured households.

Drainage charges may be recovered either in the sewerage volumetric rate (four companies) or in the meter related standing charge (three companies) or in a separate site area charge (one company) or according to the property value (two companies).

Large users

Since the mid 1990s, most companies in England and Wales have developed special tariffs for large users (both water and sewerage), offering lower volumetric rates. These generally take one of two forms:

- A falling block tariff which offers a lower volumetric rate above a qualifying threshold; or
- An optional tariff which offers a fixed charge and a lower volumetric rate for all volumes for qualifying users

In general, the qualifying threshold is around 75-100 Ml/year. Typical volumetric rates will vary between GBP 0.35/m^3 and 0.55/m^3. Since 1997 companies have been expected by Ofwat to set their large user tariffs with reference to long-run marginal cost or LRMC (see MD159).

7. TRENDS IN PRICES AND BILLS

Overall trends

Prices and bills in England and Wales, since 1989, have tended to follow the overall price caps set for the industry as follows (annual average, constant prices, percent):

1990/91 to 1994/95	5.2 percent
1995/96 to 1999/00	1.3 percent
2000/01 to 2004/05	-2.1 percent

Households

Household bills rose steeply in the first ten years after privatisation in 1989 (by about 40 percent in real terms). In 2000-01, the first year of new price limits, household bills have fallen by an average of nearly 13 percent.

Figure 1 shows the trend in average household water and sewerage bills in England and Wales in May 1999 prices for the period 1989-90 to 2000-01.

Non-households

Tables 1a and 1b shows the level of average non-household water and sewerage bills for the three years 1995-96, 1999-2000 and 2000-01 for the ten largest

companies (WaSCs). On average, water bills for non-households, in constant prices and rising 1000 m^3/year, have fallen by 9.5 percent and 11.3 percent respectively between 1995-96 and 2000-01 (Table 1a/1b).

Large users

Figure 2 shows typical bill savings (in percent) for large user water tariffs in 1999-2000 and 2000-01. This shows that, at an industry level, typical savings over the standard tariff increased from 21 percent in 1999-2000 to 24 percent in 2000-01.

REFERENCES

Future Water and Sewerage Charges 2000-05 (November 1999).

2000-01 Report on Tariff Structure and Charges (May 2000), published annually.

Director General's Annual Report 1999-2000 (May 2000), published annually.

Letters to the companies: MD152 (13 September 1999), MD159 (11 February 2000).

Water and Sewerage Bills 2000-01 (March 2000) obtainable from Ofwat Library and Information Services, Tel: (44-121) 625-1373, Fax: (44-121) 625-1362, E-mail: enquiries@ofwat.gtnet.gov.uk.

Water pricing in France

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MAIN OBJECTIVES OF WATER PRICING POLICY IN FRANCE

In France, water pricing, has always been considered a political issue. Firstly, local communities, which are in charge of supplying drinking water as well as sewage and wastewater management, could not avoid the financial aspect. Investments are often very costly; running costs must be covered. However, domestic water users are also voters and it was necessary to consider the economic and social dimension in water pricing. That's why we find subsidies from the local municipal budget in many towns; in this way drastic price increases can be avoided. Of course, industry connected to public networks can indirectly benefit from those subsidies.

In agriculture, the importance of irrigation for some specific cultures is essential. Farmers have always considered water found near their properties as belonging to the property. Consequently, they thought they could use this water 'free of charge'. Even when the State was investing in large irrigation systems, users covered only a fraction of the running costs.

The financial aspect of the question gains prominence, again, as significant investments are necessary to update systems in order to comply with standards for drinking water supply or sewage; and as we see the entrance of the public sector in this area, local communities being able to contract with private companies for water services.

Usually, in water pricing, neither environmental costs nor resource costs are taken into account in the total costs to be recovered. Costs to be recovered include financial costs, running costs (operation and maintenance) and capital costs.

Cross-subsidies still exist. The State, as well as the Regions, participates financially in some huge investments, like dams, or smaller ones, such as irrigation works or rural wastewater treatment plants. Here, French Water Agencies play an important role by subsidising many waterworks such as wastewater treatment plants, municipal or industrial, or sewage networks, dams and others. Those subsidies (or soft loans) come from revenue collected on the basis of the polluter pays principle or the user pays principle and can cover more than one third of the total amount of investments.

According to studies recently carried out in France, the approximate recovery level of those financial costs is, on average, nearly 90 percent. Important disparities are to be observed: the drinking water supply sector is the one where the recovery rate is the highest (nearly 100 percent). The sewage and wastewater sector has a high level (more than 80 percent) but with a disparity between the urban sector (where recovery is substantial) and the rural sector (still receiving some subsidies).

For household water services, prices are usually calculated by adding a fixed element to a variable one, which is strictly proportional to the consumption. Large use of water meters in individual households, as well as in an increasing fraction of flats, is an important element of public information and even awareness.

In irrigation, farmers pay a very low part of the costs (from 35 to 40 percent), at the moment, state subsidies still remaining very important. Lastly, the industrial sector covers about 70 percent, benefiting too from transfers coming from the household sector. In this sector, permits and taxes play an important complementary role, promoting a greater awareness of water issues, while still taking economic realities into account, the lower the price the better.

PRICE REGULATION

In the 36,000 local communities existing in France, the mayor, who is elected by the citizens, has a major role to play. He can contract private companies, create a joint public company with other local communities for various water services and is always responsible for the overall level of prices in water services. The role of water users, being also voters, is, of course, essential. In order to facilitate openness, a recent law, adopted in 1994, requires the mayor to produce a yearly detailed report which is presented and discussed by the members of local council. This report is also published in local newspapers.

This same law created a more rigid framework for the contracting policy adopted by mayors when dealing with private companies in order to avoid non-balanced public-private partnerships. This is particularly important as private companies, which are subsidiaries of only four major industrial groups, handle more than two-thirds of water supplied to households.

A new water law, which could be adopted in 2001, seeks to expand this regulation process by creating a high council for water services. This new institutional body will try to improve the quality of contracts signed between local communities and private companies, as well as develop a fair competition between the four industrial groups mentioned.

Water prices are strictly monitored by the French Water Agencies. This allows the comparison of various neighbouring situations and ensures the biggest transparency, which is essential in the price regulation process.

TREND AND HISTORY OF PRICING POLICIES IN FRANCE

Drinking water supply, sewage management and irrigation have always been considered essential tasks to be handled by political decision-makers (from a local, regional or even national level).

One of the first major steps was taken after the Second World War, when the State greatly subsidised drinking waterworks when financing the reconstruction of local communities damaged in the war. Many networks and water towers were built or rebuilt. As subsidies were important, water prices only covered a small part of capital costs.

The promotion of agriculture was also considered as an essential part of economic activity. Irrigation received huge subsidies, being an important tool

to increase production; farmers had to pay only a symbolic part of the financial costs of irrigation works. The development of the Common Agricultural Policy, ensuring revenues proportional to production, supported this process by encouraging farmers to increase the irrigated surface.

Another important step was made with the creation of French Water Agencies in the sixties. Taxes and fees, collected in households and industries, not agriculture, were used to subsidise waterworks. A main consequence was the decrease of state subsidies, the government arguing that money could be found by water agencies.

A third step occurred, in the beginning of the eighties, with the process of decentralisation. At that time, the State decided to give more power to regional and local bodies and stopped subsidising some major sectors, such as urban sewage management. Of course, local communities had to ensure the continuation of public water services. Some of them gave substantial grants to those services in order to avoid price increases; in doing that, they used the municipal budget and the taxpayer was paying for the remaining part of services, which was not covered by water users. In other local communities, the mayors decided to increase the privatisation of water services, trying by that to let the private sector bear the burden of new investments. In many cases, necessary price increases were spread out over a number of years in order to avoid a more extreme increase.

The implementation of the new urban wastewater treatment directive began in the nineties and led to huge new investments and a knock-on effect of additional price increases. At the same time, a new law introduced regulations preventing local communities from granting public water services. Consequently, at the beginning of the last decade, water prices for households grew yearly by nearly 10 percent (not including inflation). Nowadays, this rate is much lower but always higher than the inflation rate.

Water prices, paid by households, are approximately EUR 2.8 per cubic meter. These prices cover drinking water supply as well as sewage. They vary widely and depend on the level of recent investment. By paying the costs for wastewater treatment, we can consider that a part of environmental costs are now covered, thanks to the implementation of the urban wastewater treatment directive.

In agriculture, farmers are not yet ready to pay a price covering the full financial cost of services in irrigation. But, it can be seen that some political decision-makers believe that water prices must increase and they must stop most subsidies. They are also trying to introduce new taxes penalising diffuse pollution from agriculture.

The next decade will be particularly important when implementing the new framework water directive, which proposes a better use of economic instruments in water management. The first step necessary will be the stimulation of a better understanding of costs and the development of a new transparency.

In this context, the new water law, which is planned to be adopted in 2001, will be the main tool for action on national level. The above mentioned creation of a high council for water services, a development of new taxes, particularly in agriculture, and the implementation of the new framework directive will be the main issues tackled by this law. As always in water issues, a new law is highly

sensitive and a political consensus must be found. Nevertheless, whatever the result, this will be a new step in the development of the use of economic instruments in water management.

Water pricing policies in the Netherlands

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1. INTRODUCTION

This paper discusses water pricing policies in The Netherlands. After presenting the organisation of Dutch water management (§ 2), it discusses the different economic instruments (§ 3) and the way in which tariffs are set (§ 4). Furthermore, this paper presents the development of costs and tariffs, the effects of new (EU) requirements, and possible institutional and policy changes. Despite significant increases, public support of the tariffs is generally still sufficient (§ 5). Based on an explanation of this phenomenon, the paper formulates an agenda for the coming years to ensure continued support. It is argued that this agenda applies to other European and non-European countries too (§ 6).

Unless otherwise stated, the financial data in this paper come from the Dutch Central Statistical Office <http://www.cbs.nl/>.

2. DUTCH WATER MANAGEMENT

Dutch water management has a long tradition. An important role is played by the water boards (57), which are responsible for flood protection, drainage, regulating emissions and sewage treatment. Individual landowners are responsible for the maintenance of the smallest drainage canals. The management of the 'state waters' (e.g. the main rivers) and the connected infrastructure is the responsibility of Rijkswaterstaat, the national water management agency. The provinces (12) are responsible for groundwater management and supervise the water boards and the 537 municipalities. The latter are responsible for the sewerage system. Drinking water supply is the responsibility of 20 publicly owned private companies, one municipal service (Amsterdam) and one very small private company. Water management policy is made primarily at the national and provincial level through a system of multi-level planning. Perdok 1998, Mostert 1998a).

The total costs of water management are approximately EUR 5,700 million (Commissie Water-beheer 21e Eeuw 2000). This constitutes 1.5 percent of the gross national product.

3. ECONOMIC INSTRUMENTS

Most economic instruments in Dutch water management have a financing function. In addition, there are two 'green' water taxes and one mineral tax with, at least officially, an incentive function.

3.1 Financial instruments

ASWP charge (EUR 999 million; 2000)

The ASWP (Act on Surface Water Pollution) charge finances all water quality tasks of the water boards, including sewage treatment, and some water quality tasks of *Rijkswaterstaat*.[1] The charge is based on the number of 'pollution units' (p.u.), whether discharged directly or into the sewerage system. One-person households are charged for one p.u., and larger households for three or 3.5 p.u. Small industries are charged for a number of pollution units that is based on simple tables, using parameters such as water use or volume of production. Large industries pay for the pollution, which is measured. The water board's tariff equals the total budgeted costs for water quality management divided by the total number of pollution units. In 1997 it ranged from EUR 30 to 61. The tariff of Rijkswaterstaat is set primarily political and is presently EUR 32.

Water board charge (EUR 549 million; 2000)

The water board charge finances surface water quantity management (drainage, flood protection) by the water boards. Dyke reinforcement along the main rivers and the sea is, however, heavily subsidised by the national government through the provinces. The tariff of the water board charge is calculated in a complicated way. Five overlapping categories of users are identified: owners of land, renters of land, owners of buildings, users of buildings for commercial purposes, and the inhabitants of the water board area. The costs of the water board are first allocated to specific tasks and then allocated to the categories that benefit from these tasks. Afterwards, the tariff per hectare (land), guilder (buildings) or person (inhabitants) is determined. The tariffs differ significantly between categories and between water boards, depending on the natural circumstances and the exact allocation of the costs. For instance, in 1997 the tariff for the category inhabitants ranged from EUR 7.2 to EUR 41.7 (Stevens 1997, Van Elk 1997).

Groundwater abstraction charge (EUR 15 million; 2000)

The groundwater abstraction charge originally financed only provincial research for groundwater quantity management and compensation payments of damage that could not be attributed to individual groundwater abstractions. Since 1997, the revenue can also be used for financing so-called 'anti-desiccation' projects, such as the construction of weirs to maintain surface and groundwater levels and thus protect nature.

Sewerage charge (EUR 651 million; 2000)

The sewerage charge is levied by 96 percent of the Dutch municipalities and finances, on average, 73 percent of the maintenance and replacement costs of the existing sewerage system. Twenty-seven percent is financed from the municipal real-estate tax or from other sources, such as subsidies. The costs of new sewers are recovered from the proceeds of the sale of building plots developed by the municipalities. Households usually pay a fixed amount and industry a fixed amount plus an additional amount based on water use. In 1996, the tariff was on average EUR 82, ranging from EUR 45 to EUR 272, (Elshof and Oomens 1997).

1. The administrative costs of permitting can be recovered though administrative fees.

Drinking water price (EUR 1,366 million; 1997)

The drinking water price finances water production and distribution by the public water supply companies and includes the different taxes that the companies have to pay (§ 3.2), (VEWIN 1999). The drinking water price usually consists of a standing charge and a price per cubic meter; large users often get some deduction. In 1997, the standing charge for households ranged from zero to EUR 75 per year and the price per cubic meter from EUR 0.71 to EUR 1.57.

Cost recovery

In total, these financial instruments finance around 75 percent of the costs of public water management. Often, however, there is no close match between the actual water pollution or use and the charges paid (Mostert 1998, CIW 1999). For instance, farmers do not pay for pollution caused by pesticides. Moreover, the users and polluters experience other costs as well. These include the costs of maintaining the small drainage canals, the costs of industries abstracting or treating their own (waste) water, and the costs of complying with environmental requirements and land-use restrictions. In addition, they have to pay the two water taxes discussed below.

3.2 Incentive function and/or revenue raising

Incentive effect

Several instruments with a financial function have an incentive effect too. The effect of the ASWP charge on pollution by large industries has been very significant, especially since the tariff includes more than only sewage treatment and is therefore relatively high (Bressers 1983; Commissie onderzoek financiering 1999). The drinking water price probably has very little effect on domestic water use but more on agricultural and industrial water use (see also below). The water board, the sewerage and the groundwater charge have no incentive effect. The last two are independent from actual water use or pollution, and the tariff of the latter is very low.

In addition to these financial instruments, three taxes with an official incentive function should be mentioned: the groundwater abstraction tax, the water supply tax and the mineral tax.

The groundwater abstraction tax (EUR 163 million; 1999)

The groundwater abstraction tax was introduced in 1995 as one of several 'green taxes.' At the time the planned increase of the fuel tax, introduced in 1992, was cancelled because of the effects further increases would have on economic sectors using much fuel. To compensate for the revenue foregone, the green taxes were introduced. However, the green taxes were also meant to have an incentive effect. Contrary to, for instance, income tax, which 'discourages' employment, the green taxes were supposed to discourage environmentally harmful activities and, in the case of the groundwater abstraction tax, reduce groundwater use in favour of surface water use.

The revenue of the groundwater abstraction tax goes into the general budget. The tariff per cubic meter is EUR 0.16 for public water supply companies and EUR 0.12 for others (next year EUR 0.16 too). For environmental reasons, the tariffs are

lower for installations cleaning recyclable bottles, for instance. Companies, abstracting less than 40,000 cubic meters (m^3) per year, and pumps, with a capacity of less than 10 m^3/hour, are exempted (VROM 2000a). This has stimulated farmers to reduce their drinking water use and increase their, exempted, groundwater abstractions, sometimes piercing though protective layers (IWACO 1997).

The water supply tax (EUR 113 million; 2000)

The water supply tax was introduced in 2000 as a green tax (VROM 2000b). Presently, drinking water deliveries are taxed at EUR 0.285/m^3 up to 300 m^3, minus EUR 11.34. In 1999, the VAT on drinking water supply had been increased from six percent to 17.5 percent and income tax had been lowered simultaneously. However, since drinking water is a primary need, parliament decided that the tariff for the first 27 EUR should continue to be six percent. However, according to EU law, it is impossible to use two tariffs for one product, so the tariff for all supplies became six percent again. To compensate for the lost revenue and meet the quantitative goal that government had set itself of 'greening' the taxes (EUR 318 million per year), the water supply tax was then introduced.

Both the water supply tax and the groundwater abstraction tax got much criticism from the Dutch Consumers' Association and the VEWIN, the Dutch Waterworks Association. Comparing water prices and water use in different parts of The Netherlands, the VEWIN concluded that the price elasticity of domestic water use is zero and, consequently, no reductions in use can be expected. Moreover, the VEWIN argues that the environmental effects of drinking water production in The Netherlands are limited, and that the taxes result in an unfair shift in the tax burden from small households to large households and from higher income groups to lower income groups (Waterspiegel, October 1999; higher income groups in The Netherlands use ten percent less water per capita, perhaps because of better appliances).

Mineral tax

The mineral tax was introduced in 1998. Farmers have to pay for the amount of nitrates and phosphates produced on their farm (manure) or brought onto their farm, minus the uptake by the crops and the 'allowed losses' per hectare (presently 35 kg for phosphates and 275 kg for nitrates). The exact amounts are calculated using either actual measurements or fixed standards per animal (production), cubic meter (agrochemical additions) and hectare (uptake). The tariff for 2000 is EUR 0.68 per kilo (k) for nitrates, EUR 2.27/k for the first ten kilos per hectare of phosphates and 9.08 EUR for any additional kilo of phosphates. Data on the revenue, which goes into the general budget, is not yet available.

4. PRICE REGULATION

There is limited need for price regulation in The Netherlands. Water management is still in public hands, and tariffs are usually determined following democratic processes.

ASWP charge

The tariff for the ASWP charge for the state waters is set by law and follows the usual legal procedure. The tariff is a political decision that balances environmental benefits (the revenue is spent on removing polluted sediments and other things) and the wish to limit the tax burden. The tariff for the regional waters is set by the water board concerned in a water board bylaw, adopted by the (democratically elected) council of the water board. After, the bylaw has to be approved by the (democratically elected) provincial council. It has to be noted, however, that many Dutch citizens hardly know what the tasks of the province or the water board are, and that the turn out at elections is relatively (the province) or very (the water board) low.

Water board charge

The water board charge is also determined in a water board bylaw. The tariffs obviously depend on the planned expenses and on the budget, which is adopted by the council. In addition, the bylaw setting the tariffs has to conform to the so-called 'allocation bylaw', which regulates the allocation of costs to the different categories of users. Both the 'tariff bylaw' and the 'allocation bylaw' have to be approved by the provincial council.

Groundwater abstraction charge

The groundwater abstraction charge is set in a provincial bylaw, adopted by the provincial council. The possibilities that this charge offers for financing anti-desiccation projects are usually not used as groundwater is already taxed through the groundwater abstraction charge, because of all other new environmental requirements that agriculture has to comply with, and in the light of the (albeit decreasing) lobbying power of agriculture. Many small agricultural abstractions do not even have to be registered.

Sewerage charge

The tariff for the sewerage charge is set in a municipal bylaw and depends on the costs of the sewerage system and on municipal politics. Insight into the development of costs has been increased significantly by the municipal sewerage plans, which are obligatory since 1994 (Elshof and Oomens 1997). The level of local taxes and charges is, however, politically sensitive. Moreover, it is often not politically advantageous to invest in invisible sewers, and the supervision of the municipalities on this point is limited.

Drinking water price

The drinking water price is usually proposed by the director of the water supply company and adopted by its shareholders (the municipalities and/or the province) or a board representing the shareholders. The aim is to recover the costs and not to make a profit; dividends paid to the shareholders are low

(Cramer 1999). The involvement of municipalities and provinces is supposed to prevent monopoly abuse. In addition, voluntary benchmarking of performance and efficiency has been introduced recently (VEWIN/Anderson Consulting 1999). Presently, there are ideas to make benchmarking obligatory and to establish customer service committees.

The three green taxes

The groundwater abstraction tax, the water supply tax and the mineral tax are national taxes and therefore set by national law. The tariffs are set primarily politically. The tariff of the water supply tax was set specifically to replace the revenue of the high VAT-tariff on drinking water. As explained in the previous section, the high VAT tariff was introduced simply to meet the quantitative goals for greening the taxes.

Social considerations

For social reasons citizens with a household income, on or below the minimum wage, may be exempted from paying the ASWP charge, the water board charge or the sewerage charge. The water board or the municipality concerned sets the exact criteria. Exemptions from the drinking water charge are not possible. In addition, water boards and municipalities may decide to postpone investments to ease tariff increases. This has happened, for instance, quite often, in the case of the sewerage system.

5. DEVELOPMENTS

The development of water prices and pricing policies can be discussed under four headings: cost accounting and subsidies, new (EU) requirements, institutional changes, and social acceptability.

Cost accounting and subsidies

To understand the development of costs, it is in the first place necessary to understand how the costs are calculated. Water boards, municipalities and water supply companies take operational (personnel, consumables etc.), as well as capital costs (depreciation and interest), into account. However, depreciation is based on the acquisition costs, which are usually much lower than replacement costs, especially in the case of assets with a long life span. Moreover, a net system is used. This means that not the full acquisition costs are depreciated, but the acquisition costs minus financial contributions received. These used to be significant (27.5 percent or even 90 percent subsidies for sewage treatment plants, 100 percent external financing for sewers). Consequently, capital costs and therefore tariffs increase considerably, after replacement.

To prevent sudden increases, either reserves have to be formed, or investments have to be scheduled in such a way as to prevent peaks. However, financial reserves are usually limited and the planning period for investments is usually much shorter than the economic lifespan of the infrastructure, with the possible exception of the sewerage system.

New (EU) requirements

Another factor is the need for investments. Significant investments have been made to meet the requirements of the Urban Wastewater Directive (91/271/EEC) and implement the national policy to reduce stormwater overflows. Further, many Dutch sewers are ageing and will have to be replaced in the near future.

Large increases are expected in costs and tariffs. The largest increase is expected for the sewerage system. For the period 1996-2005, investments worth EUR 7,500 million have been planned: EUR 3,400 million for replacement (8.5 percent of the total length), EUR 2,600 million for reducing stormwaters, and EUR 1,500 million for connecting presently unconnected premises. After 2005, the need for replacement will increase further. In the municipality of Tilburg, for instance, the annual costs in 2053 will be twice as high in real terms as in 1994 or even four times as high, depending on how the costs are financed, (Tilburg 1993). The costs of drinking water supply are expected to rise too, but less. No national data are available, but the groundwater tax and the water supply tax alone have been responsible for a price rise of more than 20 percent (VEWIN/Anderson Consulting 1999). The costs of sewage treatment (EUR 697 million annually, 1998) have risen mainly because of the stricter standards for nitrogen (N) and phosphate (P) removal required by the Urban Wastewater Directive. However, there are no detailed cost estimates for this. The main problem is that investments often serve several purposes simultaneously: extension, replacement, and N and P-removal.

Quite different requirements are Articles 4, 5 and 9 of the Water Directive Framework. Article 4 requires the Member States to reach a 'good status' for all their waters. Nobody knows how much this will cost The Netherlands, as it is still unclear to what extent the different derogations can be invoked. Article 9 requires the Member States to develop economic instruments that (a) have an incentive effect, and (b) ensure adequate cost recovery at least from the household, industry and agriculture categories. This may necessitate the introduction of more charging for diffuse pollution, directly or though product charges. Article 5, finally, requires an economic analysis of water use to support the application of article nine. Here, too, some changes may be necessary.

Institutional and policy changes

From 1997 onwards, there have been discussions on privatising the water supply companies and sewage treatment (Mostert 1998a). For the time being, this has been stopped by parliament, but if eventually privatisation is introduced, price regulation will become necessary.

In the meantime, and probably partly in reaction, initiatives have been taken to improve co-operation between drinking water companies, water boards (sewage treatment) and municipalities (sewerage system). Reputedly, this can save millions or even billions of Euros (KIWA/Stichting RIONED 1998). Co-operation has been difficult for several reasons. Often it is not clear where exactly the (financial) responsibility of one water manager stops and the responsibility of another begins. Moreover, many municipalities have little knowledge of and interest in water management. In addition, the water boards are wary of loosing their waste-

water treatment tasks. The Dutch water boards both operate the treatment plants and regulate their emissions, unlike in many other countries, where infrastructure management and regulation are separate. Some fear that the privatisation of water supply would make co-operation more difficult.

In addition, possible simplifications of the financing system of the water boards are being discussed (Commissie onderzoek financiering 1999, Admiraal and Havekes 1999, CIW 1999). The main issues are the allocation of the costs of water quantity management to the different categories of users, which is seen as very complex and lacking in transparency, and the high tariff of the ASWP charge, (Hijum 2000). The allocation of the costs touches upon the discussion of the governance structure of the water boards, which is also under discussion. Presently, the different categories of users are represented in the board more-or-less in proportion to their financial contribution. Changes that are being considered include a reduction in the number of categories of users and a simpler system of allocating the costs.

The present ASWP charge may lead industry to pretreat its own wastewater or disconnect from the public infrastructure altogether (estimation: 500,000 p.u.). This leaves the water boards with the costs of coping with relatively clean wastewater flows and the capital costs of the existing infrastructure. This increases the tariff even further. A solution that has been proposed is to replace the ASWP charge with an (on average 40 percent lower) sewage treatment charge that finances only sewage treatment in a strict sense, and include the costs of coping with stormwaters and other aspects of water quality management in a new water board charge. For direct emissions an emission charge would have to be introduced. In addition, the 'pollution units' could be replaced by 'costing units' that are in closer relation to treatment costs (CIW 1999). For instance, the volume of wastewater in cubic meters would be taken into account, but heavy metals would not be taken into account any more, because they do not influence treatment costs.

For the short term, a different solution has been chosen. From January 1, 2001, the water boards will be entitled to use the revenue from the ASWP charge for subsidising industry, if they continue to use the public infrastructure (in fact a reduction of the tariff). Moreover, in the future, only water boards will be allowed to treat the wastewater of small companies and households, thus prohibiting water industry offering cheap wastewater treatment services.

Another change that has already been agreed upon is to allow experiments with the 'water track' from 1 January 2001 onwards. In specific cases, the ASWP charge can be made volumetric and combined with the drinking water bill and the sewerage charge. In effect, this would increase the marginal cost of water use and, thus, it is believed, reduce water use. Yet, some doubt that the reduction would be significant (low price elasticity). They argue that the financial burden for large families will increase and that the costs of sewage collection and treatment hardly vary with water use (e.g. Hoogendoorn, Dijkgraaf and Versteeg, 2000).

Social acceptability

In any democracy, pricing policies can only be 'sustainable', if the resulting prices and tariffs are accepted by the population at large. From this point of view, the situation in The Netherlands is still rather favourable. In 1999, Dutch con-

sumers were reasonably to very satisfied with the drinking water quality. Some 70 percent thought the water supply should remain in public hands, and 51 percent thought the price of drinking water was exactly right. (However, only ten percent knew what the price was. (H_2O 2000, No. 3, p. 4). Local authorities and water boards do get a lot of critical attention, but this has not yet lead to serious problems. Possible reasons are the following:

- There is not one water bill but several bills. Consequently, the individual bills are usually much lower than for instance the municipal real estate tax.
- The level of water services provision is very high, especially in the field of drinking water supply.
- There is a long tradition of cost recovery in Dutch water management, and price increases have been significant but gradual.
- Water management is public and water prices are not seen as 'paying for the director's Rolls Royce'.

Still, the present relative complacency may not last forever. There has already been quite a lot of criticism against the groundwater abstraction tax and the water supply tax and farmers are very wary of any tariff increases. Moreover, recent protests concerning the fuel price and the fuel tax have shown that incentive taxes are not always very popular, further, the environment is presently less an issue than 15 years ago.

6. THE AGENDA FOR THE COMING YEARS

In the coming years several activities will have to be undertaken to foster public support of Dutch water management, ensure its financial sustainability and facilitate the use of incentive taxes and charges. Based on the preceding discussion, eight tasks can be formulated:

1. To continue the provision of good quality water services that meet public demands with the least financial and environmental costs possible.
2. To explain what the revenue of the financial instruments is used for.
3. To explain the purpose of instruments with an incentive function and prevent the introduction of 'fake' green taxes that give green taxes a bad name.
4. To increase environmental awareness.
5. To make the necessary changes for implementing the Framework Directive Water.
6. To simplify the financing system and, whenever possible, the institutional structure (transparency).
7. To promote the active involvement of the public through public information, consultation and participation.
8. In general, to maintain the legitimacy of and trust in water management.

Some of these tasks deserve separate attention and research, such as (1), (5) and (7). All tasks, however, should get attention whenever the position and financing of the water boards is discussed, the privatisation of the drinking water sector is debated, systems for river basin management planning are designed, or any other aspect of water management is at stake. Furthermore, it seems that these eight tasks are important not only for The Netherlands, but for all European and many non-European countries. The priorities and concrete solutions chosen will, of course, have to depend on the specific national circumstances.

REFERENCES

Admiraal, R.J.; Havekes H. J. M., (1999), 'De waterschapsbelastingen in de 21e eeuw', (Water Board Taxes in the 21st Century), in *Het Waterschap*, No. 19, pp. 867-877.

Bressers, J.T.A., (1983), *Beleidseffektiviteit en waterkwaliteitsbeleid; een bestuurskundig onderzoek,* (The Effectiveness of Water Quality Policy; Public Administration Research), Ph.D. thesis, University Twente.

CIW: Finaniering Zuiveringsbeheer, *Voorstel voor een nieuwe heffingsmaatstaf en bouwsteen in de discussie rond de financiering van het waterbeheer* (Financing Sewage Treatment; Proposal for a New Tax Base, and Building Block for the Discussions on a New Financing System for Water Management), Commissie Integraal Waterbeheer: Den Haag.

Commissie onderzoek financiering, (1999), *Waterschapsbelastingen in de 21e eeuw*; *Eindrapport van de Commissie onderzoek financiering*, Unie van waterschappen: Den Haag.

Commissie Waterbeheer 21e Eeuw, (2000), *Waterbeleid voor de 21e eeuw*; *Advies van de Commissie Waterbeheer 21e eeuw*, (Water Policy for the 21st century: Advice of the Commission Water Management 21st Century).

Cramer, W., (1999), *Recent Developments in Public Water Supply in the Netherlands*, Paper for Arbeitstagung BGW/DGVW Landesgruppen Niedersachsen/ Bremen, Goslar, 14-15 October 1999.

Elk, G.A. van, (1997), *Rapportage Analyse Begrotingen 1997 Waterschappen* (Reporting Analysis; Water Boards' Budgets 1997). NCBO: Zutphen.

Elshof, E.J. ten, Oomens A.J., (1997), *Evaluatie GRP'en; Effecten van de verplichting tot het opstellen van een gemeentelijk rioleringsplan in de gemeentelijke beleidspraktijk* (Evaluation MSPs: Effects for Municipal Practice of the Requirement to Prepare a Municipal Sewerage Plan), SGBO/Grontmij. The Hague: Ministry of Public Housing, Physical Planning and the Environment.

Hijum, Y.J., (2000), 'De trits: gewogen en te licht bevonden' (The Unity of Pay, Say and Interest: Measured and Found Too Light) in *Het Waterschap*, No. 10, pp. 468-475.

Hoogendoorn, P., Dijkgraaf E., Versteeg N., (2000), 'De Correcte Prijs van Water' (The Correct Price of Water) in H_2O, No. 11, pp. 23-25.

IWACO (1997), *Milieu-effecten, uitvoerbaarheid en economische effecten van de grondwaterbelasting en de afvalstoffenheffing*, (Environmental Effects, Implemen-

tation and Economic Effects of Groundwater Tax and the Waste Tax), IWACO: Rotterdam.

KIWA/Stichting RIONED (1998), *Optimalisatie van de waterketen; winst door samenwerking*, (Optimisation in the Water Chain; Gains by Means of Co-operation).

Mostert, E., (1998a), *The Allocation of Tasks and Competencies in Dutch Water Management*; *Discussions, developments and present state*, RBA Series on River Basin Administration, Research Report No. 7, RBA Centre: Delft.

Mostert, E., (1998b), *Costs and Financing of Dutch Water Management*; *Focus on the water services sector*, RBA Series on River Basin Administration, Research Report No. 8, RBA Centre: Delft.

Perdok, P.J., (1998), 'The Netherlands', in: Correia, F.N. (ed.), *Water Resources Management in Europe. Volume 1: Institutions for Water Resources Management in Europe*, Balkema: Rotterdam.

Stevens, L.G.M., (1997), 'Doelmatigheid en eigen belastingheffing: een contradictie?' (Effectiveness and Separate Taxes: A Contradiction?) in *Het Waterschap* Vol. 82, No. 1, pp. 12-24.

Tilburg, (1993), *Gemeentelijk Rioleringsplan Tilburg*. (Municipal Sewerage Plan Tilburg), Municipality Tilburg.

VEWIN, (1999), *Waterleidingstatistiek 1997*. (Water Supply Statistics) Vereniging van Exploitanten van Waterleidingbedrijven in Nederland: Rijswijk.

VEWIN/Anderson Consulting, (1999), *Water In Zicht*; *Benchmarking in de Drinkwatersector*.

VROM, (2000a), *The Netherlands' Environmental Tax on Groundwater*; *Questions and Answers*, Ministry of Housing, Spatial Planning and the Environment.

VROM, (2000b), *The Netherlands' Environmental Tax on Water Supply*; *Questions and Answers*, Ministry of Housing, Spatial Planning and the Environment.

Report on Lille 2

Lille, September 13-14, 2000

The following is a synthesis of the International Conference Lille 2: 'Europe of Water, Water of Europeans — Integration of Economic Assessment in the Decision-Making Process' held in Lille, September 2000. Edited by R. Andreas Kraemer, Anne-Gabrielle Mazurek, Wenke Hansen, Eduard Interwies, ECOLOGIC, Berlin

1. The International Conference Lille 2, 'Europe of Water, Water of Europeans — Integration of Economic Assessment in the Decision-Making Process', took place in Lille (France) under the auspices of the French Presidency of the European Union, at the invitation of the French Ministry of Land Planning and Environment, the French Water Agencies, the Region Nord-Pas de Calais and the European Commission (DG Environment and TAIEX[1]).

2. The participants included representatives of: the French government; the ministries of environment of the Member States of the European Union[2] and the Accession Countries;[3] the European Parliament, the European Commission and other European institutions; as well as representatives from environmental NGOs, farmers associations and industry, researchers and consultants.

3. This conference was a first step in the implementation of the economic elements of the Water Framework Directive (WFD). The Conference's objective was to identify practical options for implementation, and to understand their strengths and limitations. The conference focused on the following aspects:

   - Economic analysis of water uses in river basin districts;
   - Cost recovery, including the internalisation of environmental and resource costs;
   - Incentive pricing for a rational use of water;
   - The next practical steps in promoting the implementation of the WFD.

4. This report is a record of the presentations and discussions that took place during this two-day event.

PREAMBLE

5. The participants agreed that water is a natural resource and a common heritage, which must be treated as such, and not a commercial product like any other. This resource needs to be protected, defended and managed in the interest of

1. Technical Assistance Information Exchange Office.
2. EU Member States represented were: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom.
3. Accession Countries represented were: Cyprus, Estonia, Hungary, Poland, and Romania.

the environment, public health, food production and other activities. In addition to the setting of quality and emission standards and the identification of best practices in water management, a just and rigorous economic assessment of water use is one of the instruments for ensuring a high level of protection of water resources.

6. The Conference Lille 2 showed that the implementation of effective protection and sustainable management of water resources is one of the most important challenges in the years to come. For this, it is vital to:

   - Develop new economic instruments;
   - Ensure efficient and equitable pricing policies which take account of different users;
   - Apply the polluter-pays principle and the resource-user-pays principle;
   - Integrate economic assessments into decision-making at all levels.

7. Finally, it is evident that the new WFD is only a first step towards a sustainable management of water resources and that additional efforts will be necessary, particularly in order to integrate water resource protection requirements into all other policies.

8. Many uncertainties remain, however, concerning the application of economic analyses and instruments. Evaluations of practical experience are needed before any guidelines for implementing the economic elements of the Directive can be developed.

THE ECONOMIC ELEMENTS OF THE WATER FRAMEWORK DIRECTIVE: FACT AND TRENDS

9. The new WFD, which was adopted after a long negotiation process, reinforces the role of economics in water policies by key provisions.

   - Water management is not only an economic issue. However, the use of economic instruments (Article 9 WFD), such as prices and charges, are a useful means for ensuring cost recovery and achieving efficient and sustainable use of water resources. Revenues from economic instruments should remain in the water sector and be appropriately 'earmarked', rather than go into the general budget.
   - The economic analysis of water use (Article 5 and Annex III WFD) is to support the development of sound pricing policies, and to identify the most cost-effective measures for achieving the environmental objectives of the WFD.

10. Over time, the use of these economic instruments should substantially modify the behaviour of the different stakeholders and reduce pressures on water resources. The instruments thus have a triple function: to establish economic incentives for achieving environmental objectives, ensure stable finances, and

improve information. Therefore, economic considerations should be integrated into decision-making at all levels.

11. Other economic instruments are not specifically listed in the WFD but offer opportunities for improving water management. Practice shows that markets for transferable water permits could be developed, for instance.

COST RECOVERY AND INCENTIVE PRICING

12. Case studies show that the implementation of (full) cost recovery for water services and incentive pricing policies might prove to be rather complicated. In effect, cost recovery implies that there are methods for assessing the full economic cost of water services. Cost assessments, however, need to be established for each sector (households, agriculture and industries) before specific sectoral cost recovery and incentive systems can be designed.

    - *Households*: Evidence shows that water demand is responsive to price changes in the short and even more so in the long run. Social concerns must be considered in designing tariffs and pricing policies. Furthermore, cost recovery and pricing policies should operate at appropriate spatial scales. In most cases, the level of technical supply systems may be adequate.

    - *Agriculture*: Agricultural water use is highly diverse and can be quite responsive to price or tariff changes. The economic analyses required under the WFD, to be undertaken before 2004, will be a sound basis for developing adequate pricing policies. They will also feed into the deliberations on the reform of the Common Agricultural Policy in the years to come.

    - *Industry*: Much industry operates its own water supply and effluent treatment systems and pays its own costs. Due to the heterogeneity of the remaining industrial sectors that rely on public water services, and the specific situation in Accession Countries, cost recovery and incentive pricing may be difficult to establish in some cases. It may be necessary to allow for a period of transition and to develop water policies coherently and consistently.

13. An overview of tariff structures shows a wide variety, which must be accepted as a starting point for the development of new policies. Implementation must be flexible and allow for differences among countries. Pricing policies should be built on an understanding of the many factors that influence water use, and willingness to pay.

14. In the development and implementation of cost recovery and incentive pricing policies, transparency, accountability and public participation, as well as phasing-in and earmarking of revenues are essential. In some cases, institutional systems for water services and water management may need to be reviewed.

ASSESSING ENVIRONMENTAL COSTS, BENEFITS AND DAMAGES

15. Economic analysis can be applied to groundwater protection and management. Here, and in other cases, economic analyses should systematically consider preventative measures, including zoning, in order to redress the current practice giving priority to curative action.

16. Economic analyses are sensitive to the spatial scale and the time periods considered. They should also include risk assessments, which can be an important aspect of environmental externalities.

17. The analysis and allocation of costs and benefits is being practised in water user associations, and have proven to be adaptable to changing needs. In particular, the collective power of members over their association's budget ensures that willingness and ability to pay are reflected in decision-making.

18. Economic analyses have to be based on solid methodologies, some of which have yet to be developed or refined. In this context, Annex III does not at present offer operational guidance. Suitable and practicable methodologies and standards must be developed and tested as a matter of urgency. Otherwise, there is a risk of not meeting the WFD deadline for economic analysis of water uses in 2004.

ECONOMIC ASSESSMENT AND DECISION-MAKING

19. Economic assessments can provide an important part but not all of the background for political decision-making. Their usefulness depends on the choice and quality of the approaches and methods applied.

20. More data on costs, damages and benefits as well as socio-economic information, such as on the determinants of the willingness to pay for water services, are required for improving decision-making and setting the right incentives.

21. However, improving the information basis may not be sufficient if only cost-benefit analyses are applied. These alone cannot address the actual complexity of water management issues and decision-making processes (information asymmetries, multi-level systems etc.).

22. However, economic assessments are an integral part of water resource management at the operational level, and are used as a matter of course in the operation of water services infrastructure.

23. The present need for economic analyses of water use, required under the WFD, can be met only by the pragmatic application of existing methodologies on the basis of available data. Such pragmatic application will improve economic analyses and may the even more useful for decision-making.

EXPECTATIONS, CONCLUSIONS AND COMMITMENTS FOR FURTHER ACTION

24. In view of the WFD requirement to carry out economic analyses for all river basin districts before the year 2004 and the insufficiency of Annex III WFD, there is an urgent need to identify and share experiences, learn from policy successes and failures, establish best practices and minimum requirements, and draft practical guidelines on economic analysis and pricing.[4]

25. The participants of the International Conference Lille 2 would welcome the establishment of a network of experts from member states, the European Commission, and accession countries (the 'Lille Network') as an informal and effective means of supporting the proper implementation of the economic aspects of the WFD and the development of practical guidelines.

26. In the medium term, the Lille Network could contribute to reviews of:

    - Existing water tariffs and pricing policies;
    - Economic instruments for internalising environmental and resource costs, including the use of revenue (earmarking);
    - Subsidies, both in the water sector and in sectors having an impact on water resources;
    - Methodologies for economic analyses of water policies.

Minimum requirements for economic analyses as well as examples of best practice may evolve as a basis for validation and formal quality control.

27. The Lille Network should be based on open collaboration and the involvement of water users, stakeholders and the public, in order to cover the widest possible range of interests and expertise, and thus secure the quality and acceptability of resulting guidelines. Its aim should be to drive a process of convergence in water policies, in economic analyses and the financial implications of river basin management plans and programmes of measures, and the consistent application of European environmental legislation.

28. It is vital that Europe develops effective pricing policies to provide a model for other regions of the world in fighting water pollution and scarcity and establishing economically and ecologically sound water policies. The Lille Process is meant to facilitate Europe's global role.

29. This memorandum will be presented to the next informal meeting of European Water Directors on October 23-24, 2000, in Paris.

4. There appears to be no alternative because of the likely difficulty to amend Annex III of the WFD before it is put in use, or to negotiate and adopt a daughter directive on the economic elements of the WFD.

Irrigation water pricing at BRL

Jean-Pierre Nicol, Member of the Executive Board of BRL, France

1. PRESENTATION OF BRL AND LANGUEDOC-ROUSSILLON

BRL is the official acronym of 'Compagnie Nationale d'Aménagement de la Région du Bas-Rhône et du Languedoc', which means 'National Company for the Development of the Languedoc-Roussillon Region'. It is a Regional Development Company, i.e. a commercial company with a majority of public shareholders, run under special controls by the State.

- Languedoc-Roussillon is a region situated in the south of France, along the Mediterranean. The region is like an amphitheatre around the Mediterranean, with mountains in the north and west (with the Pyrenean and Spanish border in the south-west), and plains near the coast. To the east, we find the river Rhone, which is one of the most powerful rivers in the Mediterranean, particularly in summer (average flow: 1,700 cubic meters per second (m^3/s); 500 m^3/s in summer). It is a very typical Mediterranean region, very dry in summer, with the possibility of short but devastating floods in winter (October/November).

BRL was created in 1955, within the framework of a strongly backed national policy for regional development, with two main objectives:

- To supply water to all those who needed it, particularly to agriculture and to the new towns to be created on the coast for tourism;
- To contribute to the modernisation and diversification of agriculture,[1] diversification being made possible by irrigation water.

Since then, BRL has built, and still operates and maintains six dams, 105 km of canals, 125 pumping stations, 5,000 km of pressurised pipelines, six drinking water treatment plants among other projects completed, supplying drinking water to 500,000 people in peak periods (seaside tourism in summer) and raw water to 130,000 hectares (ha) of land.

In the eastern part of the region, water is withdrawn directly from the river Rhone, and is conveyed to all users through several pumping stations, canals and pipe networks. In the western part of the region, as the summer flow of the rivers is very weak (or nil), water is stored in dam-reservoirs during the rainy season, so as to sustain those rivers in summer; it is then conveyed through diversion weirs and pumping stations on the rivers and pipeline networks. Irrigation water is delivered, under pressure, to the farmers, individually, through hydrants ('in the

1. At the time, agriculture was mostly based on the vine, which was the only medium added-value crop resistant to drought.

TABLE 1

Distribution of water supplies according to use

State Concession, 1996

	Number of clients	*Discharge subscription (m^3/h)*	*Volume (m^3/h)*	*Turnover excluding taxes (MFRF)*	*Average price (FRF/m^3)*
Irrigation	5,400	145,000	51.0	59.8	1.17
Gardens	4,600	32,000	3.9	15.8	4.05
Untreated water in bulk (cities, industry)	60	10,200	16.3	26.4	1.62
Drinking water in bulk	70	2,200	6.8	19.0	2.79
Total	**10,130**	**189,000**	**78.0**	**121.0**	**1.55**

TABLE 2

Irrigation tariffs

1992, not including water agency taxes.
Prices in French francs (FRF). FRF 1 is nearly equal to EUR 0.15. All prices per m^3 per hectare/year

Contract duration	*Five years*	*One year*	*Emergency (after May 1)*
Normal irrigation			
Subscription fee	FRF 250	FRF 300	FRF 340
Volume fee	FRF 0.40	FRF 0.40	FRF 0.40
Supplemental irrigation			
Subscription fee	FRF 150	FRF 200	FRF 240
Volume fee	FRF 1.00	FRF 1.00	FRF 1.00

TABLE 3

Examples of irrigation water prices (for one year)

Prices in French francs (FRF). FRF 1 is nearly equal to EUR 0.15

	Subscription	*Volume/ha*	*Price/ha*	*Price/m^3*
Peaches	**Normal irrigation** Five years, 3 $m^3/h/ha$	4,000 m^3	750+1,600= FRF 2,350	FRF 0.59
Lettuce	**Normal irrigation** One year, 8 $m^3/h/ha$	2,000 m^3	2,400+800 FRF 3,000	FRF 1.60
Vineyard	**Supplemental irrigation**			
Wet year	Five years, 5 $m^3/h/ha$	0 m^3	750 FRF	Infinity
Dry year	Five years, 5 $m^3/h/ha$	1,000 m^3	1,750 FRF	FRF 1.75

corner of the field') equipped with meters, pressure regulation and flow limitation devices.

Over 40 years, agriculture has changed in the region and irrigated crops now represent an important part of its agricultural gross product and employment. Languedoc-Roussillon has become the first producer of peaches and apricots in France.

The experience of the last decade shows that the region is now ready to face severe droughts without damage.

2. Irrigation tariffs

2.1 Deliveries of water in BRL's State Concession schemes

Table 1, presents the distribution of water supplies among users, in BRL's State Concession, for the year 1996 (which was a rather rainy year).[2]

2.2 Water tariffs

When a farmer wants to irrigate with BRL's water, he applies for a water contract and chooses between different possible tariffs, presented in Table 2.

These base tariffs are indexed to inflation each year,[3] according to an index formula representative of BRL's costs (hydraulic works, electricity, salaries and so on).

'Normal irrigation' tariffs are aimed at the majority of irrigating farmers, for crops that need irrigation as a necessity. These tariffs are binomial (i.e. composed of the sum of two different terms), with:

- A subscription fee, based on the subscribed flow, which is the maximum instantaneous flow that the farmer will be authorised to use.[4] This subscribed flow is chosen by the farmer, according to the characteristics of his field, crop and irrigation equipment;[5]
- A volume fee, based on the volume actually used[6] by the farmer.

Subscription fee rates vary according to the duration of the contract, which is chosen by the farmer, as an incentive to long term contracts.

'Supplemental irrigation' tariffs are aimed at farmers who don't need a lot of water, and sometimes not every year (for crops like vines, activities like fertilising solution preparation, herd watering). These tariffs are also binomial, but the subscription fee is cheaper than normal irrigation and the volume fee is higher, so that if the farmer starts to use a greater quantity of water, there is an incentive for him to turn to a normal irrigation contract.

2.3 Price of water

Table 3 shows some examples of irrigation prices, estimated using the tariffs above, for different cases typical of Languedoc-Roussillon, for one hectare of land.

2. The State Concession represents nearly three-quarters of BRL's water supplies.
3. In 2000, prices are nearly 10 percent higher than 1992 prices.
4. This maximum instantaneous flow is controlled by a special device, called a 'flow restrictor', installed by BRL on the farmer's hydrant according to the farmer's subscription.
5. Of course, on request of the farmer, BRL will assist him for the technical design of the on-field irrigation equipment and the choice of the adequate subscribed flow.
6. This volume is checked at the end of the year by the meter set on the farmer's hydrant.

Some comments about these examples:

- The peach is a perennial crop; a five year normal irrigation contract is perfectly convenient. Its on-field irrigation equipment (drip irrigation, below-foliage sprinklers) is permanent and automated; it allows a very continuous use of the available water (20 to 22 hours per day), and therefore a low subscribed flow per hectare (3 m^3/hour/ha). The volume of water consumed per year is high (4,000 m^3/year).[7]

- Lettuce is an annual crop, and farmers will not grow lettuce in the same field for more than two successive years to avoid exhausting the soil; the contract will be an annual, normal irrigation contract. For such types of market gardening, farmers need flexibility in irrigation, with high subscribed flow per hectare (8 m^3/hour/ha): they want irrigation of a short duration, so as to be able to work in the field the rest of the time. The annual volume of water is not very high (2,000 m^3 per year).

- The vine is a drought resistant crop. It only needs irrigation in drier years,[8] requiring small volumes, in order to regulate grape quantity and quality. A five year supplemental irrigation contract would be appropriate. The on-field irrigation equipment is generally not so sophisticated and automated as in orchards, and the required subscribed flow is medium (5 m^3/hour/ha). The example shows two cases: a wet year (no use of irrigation water), and a dry year (1,000 m^3/ha).

These different examples clearly show that, with the same tariff system for all farmers, the price of irrigation, per hectare or per cubic meter, would vary significantly according to the specific cases. The comparison of peaches and lettuce shows the importance of the subscription fee: although peaches use twice as much water as lettuce (4,000 m^3/ha vs. 2,000 m^3/ha), the price of water for one hectare is 27 percent lower because of the subscribed flow (FRF 2,350 vs. FRF 3,200), and the price per cubic meter therefore varies in a proportion of nearly one to three (FRF 0.59 vs. FRF 1.60). For vineyards, supplemental irrigation contracts allow a smaller price per hectare when the use of water is nil or low; but the price per cubic meter is, of course, higher.

2.4 Payment recovery

Invoices are sent to farmers twice a year: the subscription fee in May, at the beginning of the irrigation campaign, and the volume fee in December after meter reading.

The payment recovery rate evolves with time and actions undertaken by BRL:

- At maturity (30 days after billing): 26 percent;

- Two months after maturity (follow-up letters): 85 percent;

7. As a perennial crop, it must be irrigated after the harvest, so as not to jeopardise the production of the next year.
8. Vineyards may do without irrigation even in dry years, but with a degradation of quality and an important decrease in the quantity of grapes.

- One year after maturity (agreement on payment schedule, water cut): 92 percent;
- Final recovery (action at law): 97 percent.

3. KEY FACTORS EXPLAINING WATER PRICING POLICY

Here, we shall list some of the main factors explaining BRL's water pricing policy (the order of presentation of the different factors has no significance).

- *No problem of water resource*. This is why the tariff is not particularly aimed at promoting water savings, although the volume fee will be an incentive to avoid any waste of water.
- *Large overcapacity of existing main waterworks*. The notion of development cost is not relevant. The problem is how to cover the existing fixed costs of the system.
- *Necessity of cost recovery*. The price of water must cover the costs of operation, maintenance, renewal of equipment, and part of the initial investment,[9] without any subsidy.[10]
- *Wish for a single tariff system for all farmers*. This is clearly a political will, aiming at equity among farmers, whatever their distance from the water resource.
- *Wish to limit the inter-annual variations of earnings and securing income*. As the volume of water used by irrigation may vary to a great extent from one year to another depending on the climatic conditions, this wish explains the importance of the subscription fee versus the volume fee. It is also the reason for encouraging long term contracts.
- *Character of relationship between BRL and the farmer*: *contractual*. Farmers have the choice of applying for or not applying for a contract. They are not obliged to use BRL's water. In many places, they can use underground or river water, which is generally cheaper (even though it causes problems to a scarce resource), or they may practise rain cropping with no irrigation (durum wheat, vine, etc.). This makes it important to propose different types of contracts adapted to the different situations of farmers. It explains the supplemental irrigation contract, because generally farmers do not sign long term contracts for vineyards with the normal irrigation tariff as it would be too expensive for their low and variable use of water.
- *Contributive capacity of farmers*. The price of water cannot exceed the profit margin of the farmer (if so, he would stop his activity!) or the additional profit he obtains with irrigation (in this situation, he would turn to rain cropping). This is a very important factor for BRL, because our irrigation tariffs are already quite high, and we consider that we can no longer

9. Initial investment is subsidised up to 60-80 percent for agriculture and 50 percent for urban waters; there is no subsidy for industry. The remaining part is financed by loans, borrowed by BRL.

10. At the beginning, there were subsidies to cover part of those costs. These subsidies were stopped progressively from 1983 to 1988, and there have been no more such subsidies since 1989.

increase them easily. In confirmation of this supposition, we note that: (1) Between the years 1989-1992, the irrigation of maize disappeared from BRL's schemes, because water prices had become too high compared to the gross product of maize; (2) In 1993, the tariffs were changed, with an average increase of 20 percent. Previous subscriptions were not recovered in totality; and (3) We also note a small but constant erosion of subscriptions (nearly two percent per year) in recent years.

4. PARTICIPATION OF DIFFERENT ACTORS IN DEFINING WATER PRICING POLICIES

The proposal of new tariffs is not a frequent exercise: the tariff system includes a base tariff and an index formula, so that prices evolve automatically according to inflation. The tariff system in effect at present was put into force in 1993; the previous one dated from 1970 and lasted 23 years!

Formally, it is the supervisory board of BRL who decides on the new tariffs, which must then be approved by the government. The supervisory board is composed of eleven members, with representatives of regional and departmental councils, one representative of the Chamber of Agriculture, and one representative of BRL's farmers union. It is clear that farmers have a voice, directly and indirectly, in the final decision.

In practice, before its presentation to the supervisory board, the new tariffs are fully discussed with farmers unions, so as to reach a kind of consensus, or at least an acceptable compromise, between the necessity for BRL to balance its accounts while respecting the wishes and constraints of farmers.

5. HISTORY OF BRL'S WATER PRICING POLICIES

Since the beginning of its supplies of water (1960), BRL has experienced four successive tariff systems for irrigation:

- 1960: pure binomial tariff (based on subscribed flow and consumed volume);
- 1965: monomial tariff (based on volume), with the price decreasing as the size of the irrigated surface increases;
- 1970: binomial tariff (based on subscribed flow and consumed volume), with a variable allowance of cost-free volume linked to the subscribed flow;
- 1993: pure binomial tariff (based on subscribed flow and consumed volume).

5.1 First tariff system — pure binomial

The first tariff system set up by BRL at the beginning of the project had a pure binomial structure, based on the subscribed flow and on the volume actually consumed:

- FRF 140 per l/s (litre per second) per year;[11]
- FRF 0.042/m^3 actually consumed.

11. This tariff is based on 1960 prices.

FIGURE 1

Irrigation prices indexation 1970-1999

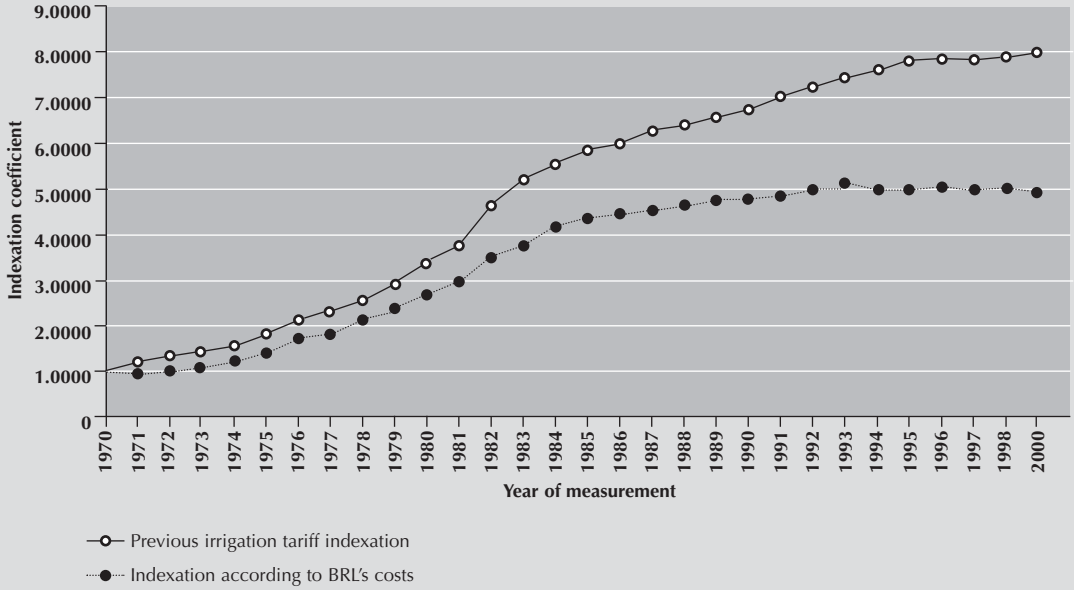


FIGURE 2

Price of water for one hectare

Subscription: 4 m³/h/ha. Base 1992

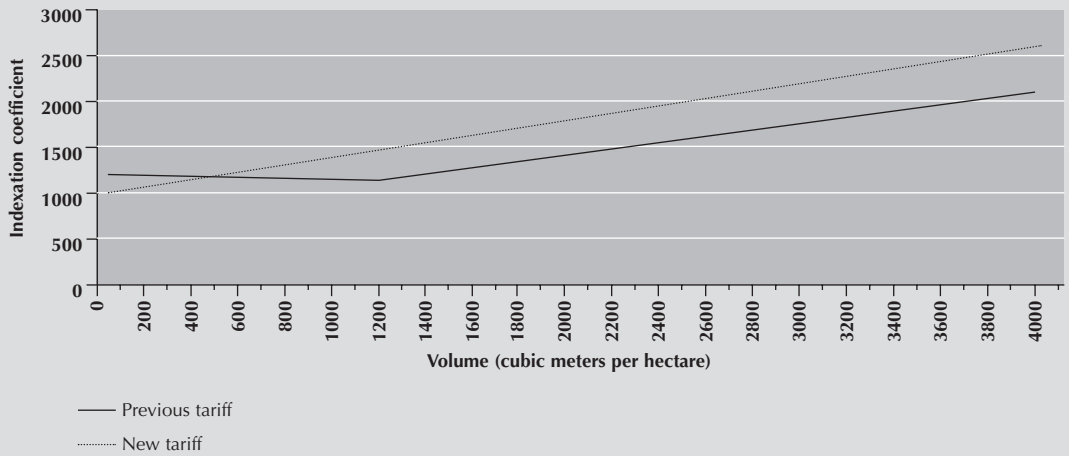
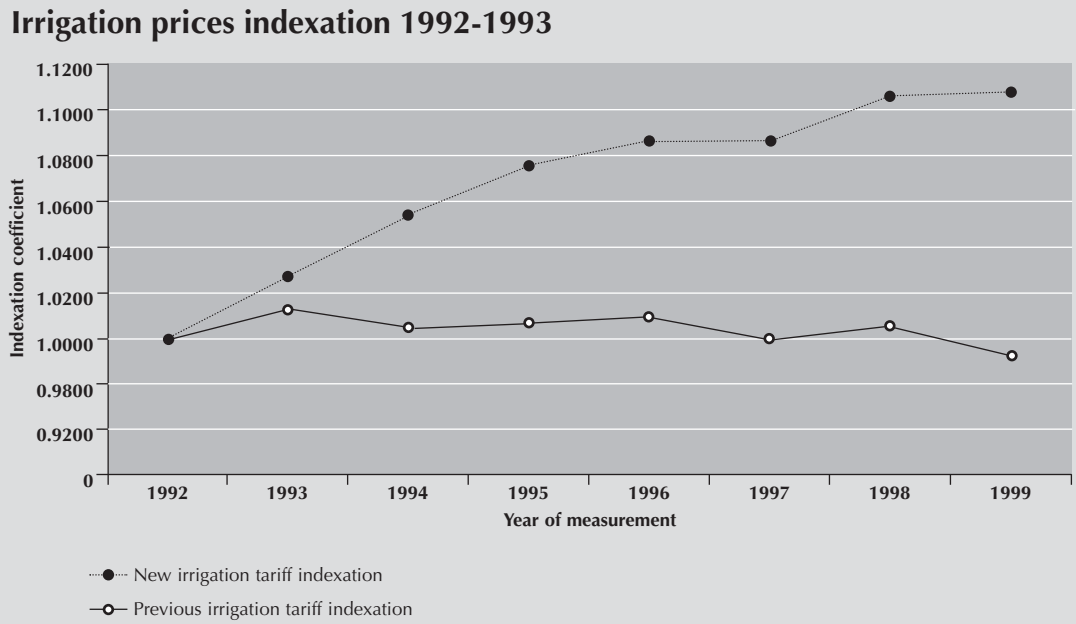


FIGURE 3



This pure binomial structure was chosen because it was considered to be the logical tariff system, corresponding to the recovery of fixed and proportional costs.

This tariff proved unsuited to the situation. At that time, farmers were not used to irrigation, they had not mastered the cultivation of the new irrigated crops and they could not estimate their benefits and risks precisely. Therefore, they were afraid of committing themselves to high fixed charges (subscription fees). Furthermore, they experienced psychological difficulties in paying the subscription fee, before any use of water had even begun, because they had the feeling that 'they were paying for nothing'.

As a result, subscriptions remained low; this tariff system hampered the development of irrigation (and consequently BRL's earnings). It was intended to provide cost recovery (independent of wet or dry years), but was ineffective.

5.2 Second tariff system – monomial

The first tariff system was a failure. It was changed after five years and replaced by a tariff based only on the volume of water actually consumed (monomial tariff system), with the price decreasing as the irrigated surface increases:

- 0 to 1,500 m^3/ha/year: FRF 0.13/m^3
- 1,501 to 3,000 m^3/ha/year: FRF 0.07/m^3
- 3,001 m^3/ha/year, and above: FRF 0.05/m^3

This tariff system was aimed at developing irrigation and the new diversified crops, by facilitating farmers' subscription: there was no fixed payment; farmers could then subscribe and only pay for the volume of water they used. Starting to use irrigation was thus made much easier.

It succeeded perfectly. Subscriptions rapidly increased, as did the development of the new diversified and irrigated crops. But this tariff system had two major drawbacks:

- The price depended heavily on the irrigated surface declared by the farmer[12] even if the same volume of water was consumed. The only data metered by BRL was the volume of water. Farmers could easily cheat by declaring surfaces smaller than reality, so as to lower their bills; this was very difficult to control.
- Earnings were highly dependent on climatic conditions.

5.3 Third tariff system – binomial with free allowance of volume

Five years later, once the 'take-off' of irrigation had been ensured, the tariff system was changed once again because of the two major drawbacks presented above. The new tariff had a binomial structure, like the first one, with a slight difference: a free allowance of volume, according to subscribed flow, was introduced. This tariff system was composed of:

- *Subscription fee*: FRF 300/m³/hour; each cubic meter per hour gives the right to a volume of FRF 300 m³ of water free of charge.
- *Volume fee*: FRF 0.32/m³ for the volume above the cost-free allowance.

In contrast to the situation ten years before, farmers had a better understanding of irrigation, and were ready to use it and pay a subscription fee. The rationale for setting up a free allowance was purely psychological: it avoided the farmers feeling that they were paying for nothing; when paying for the subscribed flow, they had the impression that they were paying for water (the free allowance) and it was easier to accept.

This tariff system proved to be well adapted and very robust: it lasted 23 years!

The problem with this tariff system appeared not to be its fundamental structure, but the index formula. This formula did not reflect BRL's costs, because it was partly based on agricultural production indexes.[13] Figure 1 shows the respective evolution of tariff indexation and indexes based on BRL's costs.

Furthermore, the government gradually stopped its subsidies for the management of the schemes in the years 1983-1989.

The important increase in productivity of BRL was not sufficient to cover the losses in the end.

5.4 Fourth tariff system – pure binomial

As a consequence, the tariff system was changed in 1993 to the current one.

In fact, the new structure is quite similar to the previous one: it is still binomial, based on the subscribed flow and the consumed volume. The free allowance of

12. For instance, the price for 4,000 m³, irrigating 2 ha, was FRF 460; the price for the same quantity on only one ha was FRF 350.

13. Agricultural product indexes were inserted in the index formula because of the negotiation of the pricing system with farmers' representatives. It was supposed to establish a kind of solidarity between BRL and the farmers. In fact, agricultural products' prices decreased in real terms in that period, although the gross product per hectare increased due to a heavy increase in yields. But, very unfortunately, BRL's index formula was based not on the gross product per ha, but on the products' prices themselves.

volume has been eliminated: it has no economic justification, and the concept of paying a subscription, as for electricity or the telephone, is now common and accepted by the farmers. Figure 3 compares the new tariff with the previous one. On average, the new price of water is more or less 20 percent higher.

In reality, the most important difference between the new tariff and the previous one is not immediately visible: it is the index formula, that is now based entirely on indexes corresponding to BRL's costs. In only six years (1993 to 1999), the Figure 2 shows the difference: ten percent!

The fact that we have gone back to a pure binomial structure, like the first tariff in 1960, is, of course, quite surprising. One could imagine that it is a kind of cycle! In fact, we must remember that the structure of irrigation, which was very well adapted to a pressurised network from a theoretical point of view, was not adapted to its environment at the beginning, particularly because of the farmers' difficulty to master irrigation. BRL went too fast! We can see that this is no longer a problem now, and it is hoped that the new tariff system will last as long as its predecessor.

The economics of H_2O

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INTRODUCTION

Water, because of its scarcity, has become subject to the normal economic market rules of supply and demand for scarce goods. Nevertheless, in most European countries, this scarcity is not reflected in the price of water. In some situations, water is considered a free good, similar to air some decades ago. As can be expected, this often results in the over-consumption of water, which in economic terms results in inconceivably high inefficiency in the supply and the use of water. An illustrative example of these market failures is the fact that in Europe the percentage of leakage from the drinking water network varies between ten and 75 percent.

The situation nowadays is changing; a real scarcity of water can be observed. At present, a considerable number of issues concerning the supply and the need for water have come to the fore. Cities like Seville and Athens are struggling to meet the need for clean water while a city like Istanbul, with its current population growth and available water sources, will probably not be able to meet the needs of its inhabitants ten years from now.

The World Water Forum, recently held in The Hague, aroused great interest in water issues. In many countries, including the Netherlands, the debate used to concentrate on the privatisation of drinking water and possible taxes on water use (Tweede Kamer der Staten-Generaal 1999). However, these debates lacked a

FIGURE 1

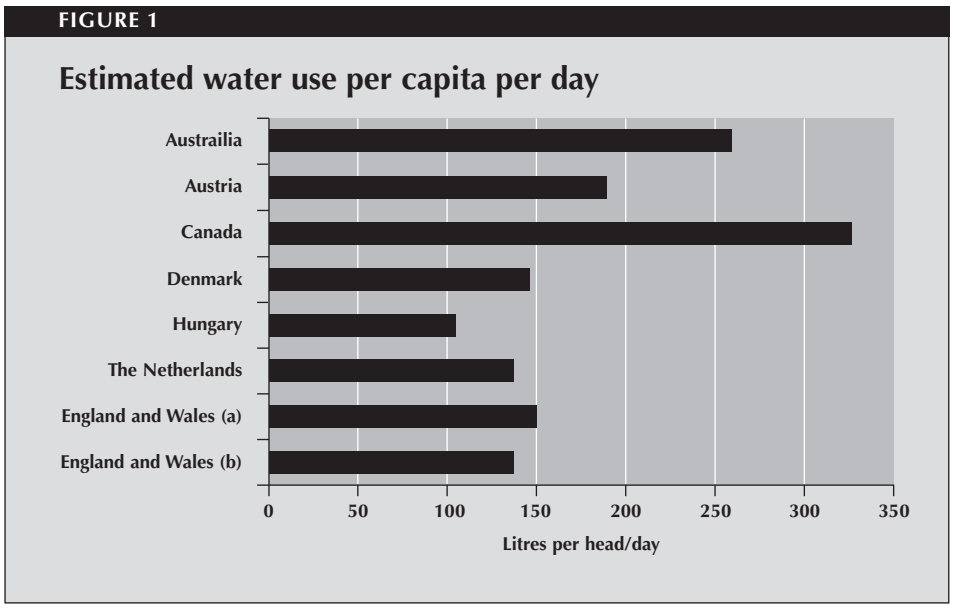


TABLE 1

Overview of household demand elasticities

For household demand

Study	*Details of study, model and estimation*	*Price elasticity*	*Income elasticity*	*Sample*
Hewitt and Hanemann (1995)	D/C choice model	-1.59	0.15	US panel
Howe and Linaweaver (1967)	OLS	-1.57	-	-
Danielson (1979)	OLS	-1.38	-1.38	-
Deller et al (1986)	OLS	-1.12	-	-
Grima (1972)	Cross-section	-0.75 (w) -1.07 (s)		Urban demand in eastern Croatia
Herrington (1982)	Time-series (1962-1980)	-0.3	-	Industrial consumption in England and Wales
Nieswiadomy et al. (1989)	-	-0.3/-0.9	-	US panel
Gallagher et al. (1981)	Pooled cross-section and time series	-0.26 9 (s)	-	137 households in Queensland
Martin et al. (1983)	Pooled cross-section and time series	-0.256	-	2159 households in Arizona
Hanke and De Mare (1982)	Pooled cross-section and time series	-0.15	-	69 domestic residences in Malmo
Laukkanen (1981)	Time-series (1970-1978)	-0.11	-	Municipal demand in Helsinki (Finland)
Howe (1982)	Cross-section	-0.06 (w) -0.57 (s; east) -0.43 (s; west)	-	Residential use in eastern and western USA
Thomas et al. (1983)	Cross-section	-0.3/-0.9	-	US panel

well-structured economic analysis of water management and related decisions.

This article will focus on the various aspects of the economics of water. First, a general analysis will be offered on water as a 'normal' economic good with different usage functions. Although many countries, like the Netherlands, have to cope with a scarcity of water (in a qualitative and quantitative respect), the situation is not as threatening for them as it is for those living in the desert, for example. That is why this article will take a look at the supply and demand of water from an economic perspective. Also, a comparison will be made between water as a specific good and a number of other 'normal' economic goods. Water, from an economic point of view, can be considered as a normal, and thus expensive, scarce good. It is necessary to focus on the price of water as a key issue in policy-making. The article will finish with a number of conclusions.

DEMAND FOR WATER

The demand for drinking water is rather complex and shows much variation. Figure 1 gives an impression of the water use per capita in a number of countries. A great number of studies on water have appeared in the economic literature. These tend to focus either on the elasticity of water demand or water demand

forecasting itself. Remarkably, the outcomes of these studies showed rather low price elasticity for water demand. Despite warnings about water shortages, the water consumer does not react to price changes. This often goes hand in hand with the political-economical belief that water is an essential good, and, thus, that the price should not be high. Consumers are also often of the opinion that the share of the cost of water in the household budget should not be too high. It seems impossible to set a real market price because of the existence of public monopolies. The pricing of water is determined by institutions, based on either a small symbolic recovery of costs or their full recovery. However, the price is hardly ever based on the balance of supply and demand.

During the recent World Water Forum there was a plea for full cost pricing, although it appeared to be difficult to fit this into the decision-making process. Nevertheless, it is important that water management is led by sound economic principles. Some examples illustrate this. Cities in developing countries (especially the slums) do not have a drinking water pipeline system because the costs of installation are too high. This results in the inhabitants having to buy their water from water vendors at very high prices. If this money could be used for the installation of a drinking-water pipeline system, the installation could, in principle, be profitable. Another example is in olive production. It is often supported by EU subsidies, even though the market for olives is already satisfied. Useful and clean water is lost through irrigation, which causes difficulties in the drinking-water supply of these areas. Obviously, the combination of policy failures and external effects results in inefficient markets for water with a considerable number of distortions.

Price elasticity

Most water demand studies record price elasticity around zero. However, some studies have different outcomes. For example, Julie Hewit and Michael Hanemann found price elasticity of around minus 1.5. Hewit and Hanemann estimated the water demand with the help of the 'two-errors models' developed in the literature on labour market economics (Hewit et al 1995). Often, in water management, the price per unit is established with reference to a certain volume of water consumed. If the threshold level is exceeded, the price per unit will increase. This tariff structure is known as the increasing block rate structure and is also used for other public goods, such as electricity. The budget curve of the optimising consumer is characterised by a kink. In their estimations, the authors assume that, besides the heterogeneity error due to data failures and other variables not included in the utility function, there is another error that plays an important role: the optimisation error. The optimisation error is the difference between the optimal volume of water and the consumed volume. The optimal volume of consumed water should be lower than the maximum amount of water supplied with a low price, while the observed value is higher than the optimal. The estimations of Hewitt and Hanemann deviate from the results found in other studies to a large extent. Table 1 shows a number of estimates from various studies on price and income elasticities. In order to obtain a better transparency of water pricing, it would be useful to gain more insight into the variables that

influence the variance in price elasticity. Techniques such as meta-analysis, (Dalhuisen et al. 2000b), could be very helpful and could be applied to strengthen water management basing it on sound economic principles.

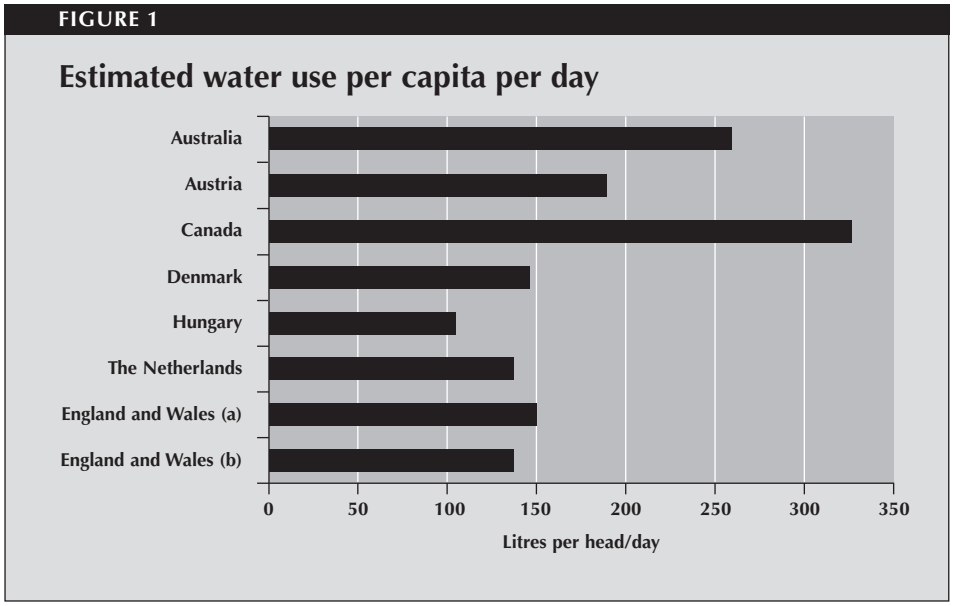
THE SUPPLY OF WATER

The supply of water requires mainly the transportation, distribution and abstraction of water. The sources for the abstraction of water are surface water and ground water. Both sources have their advantages and disadvantages. For example, in the Netherlands, surface water sources are available to a very large extent. The Rhine and the Meuse rivers are used for the production of drinking water for Amsterdam and Rotterdam, respectively. A main disadvantage is the low quality of the sources. The quality of Rhine water was so low near the end of the sixties, that it could not be used for drinking water anymore. In 1976 and 1987, the Rhine Action Plans caused significant improvement in the quality of Rhine water through discouraging large-scale polluters, Nevertheless, small-scale polluters, such as agriculture around the Rhine, resulted in a stagnation of Rhine water quality. Drinking water companies that use surface water sources must purify it at least four times more than those using ground water sources. Although the quality of ground water sources is often high, the availability is less than surface water sources. In the Netherlands, the purification of drinking water varies widely. For example, in general, surface water companies use a large amount of chemical substances, which are often unnecessary for ground water companies.

Water is transported and distributed via a network of pipelines. This means transportation from the source to the production installation and from the production installation to the consumer. As was mentioned before, large amounts of water leak away during transportation. Moreover, within Europe, the differences in efficiency are remarkable as well. The main causes for these differences are the investment policy in networks and also the soil conditions. In Amsterdam, the performance of the network is favourable because of the soil conditions, and because pipelines are well maintained and often replaced. There, the average pipeline is 25 years old. In the United Kingdom, where the average pipeline is 100 years old, the leak percentage is around 35 percent. The soil condition is of great importance because it influences the time in which a leak can be discovered. If, for example, a large leak appears in Amsterdam, huge parts of the topsoil can be removed, with the consequence that the leak can be identified quickly. In other cities a leak might remain undiscovered for a longer period, and, thus, a considerable amount of water might get wasted.

Another important controlling instrument is the water meter, which measures the water use of the consumer. It is surprising that, despite water scarcity, a number of large European cities have no water meters. A special case can be found in Amsterdam. In this city, the consumer does not pay for the amount of water used, but the system depends on the number of rooms in the house and the existence of a bathroom, kitchen, garage and garden. A person living in a large house will pay more than someone living in a small house. At present, after debating for around one hundred years, Amsterdam will have water meters installed gradually. The costs will be

FIGURE 1



high (around EUR 230 million). In London, another special case, the water bill is a fixed amount included in the rent.

WATER AS AN ECONOMIC GOOD

Water is of vital importance for human existence. Without water there will be no fertile ground and without clean water hygiene will be inadequate, which can be seen in, for instance, the developing countries. Therefore, the supply of good water has a high priority in the policy of water supply. In practice, this has led to governments playing a rather important role in the production of water. Up to a decade ago, water used to be considered as a public interest, which could be best supplied via a natural monopoly, with all kinds of disadvantages.

Water has different purposes, varying from cooking to cooling water for industry. Furthermore, water has different values for consumers and producers. Every task demands minimum quality standards. The quality standards for cooling water are lower than those for drinking water. The quality of drinking water is influenced by its chemical components. Different chemical and microbiological substances may have significant consequences for the production of drinking water, because water companies use different purification systems to reach legal water quality standards. Drinking water varies according to the quality of the water sources (Dalhuisen et al 2000a). In the Netherlands, water quantity is not a problem. The major issue there is the quality of water. Looking at the different actors, it must be noted that shipping and pesticides form the major threats for the quality of surface water and, to a lesser extent, of ground water. Quantity problems can be found in the Mediterranean area, especially.

Worldwide, there is no real scarcity of water; it is more its distribution that causes the problem. In the Netherlands, for example, half of the cost of the water supply goes to the transport and distribution of water via the pipeline system. This means that, in principle, different qualities of water could be supplied for dif-

ferent purposes. Nevertheless, in practice, the mono-functionality of a pipeline system shows rigidity, which is why high-quality water is supplied, for example, to brush your teeth, while the same water is also used for less high-value use, for example, watering the garden, or washing the car. Because of the multiple uses of water offered through the same network, it is not possible to fix an unambiguous price for different uses.

MARKETS

Water, in principle, can be subjected to market discipline. However, because of the reasons mentioned above, many governments in Europe have decided to include political considerations. In the Netherlands, the provinces and governments own most of the shares of the water companies. The main reasons for this are the profit that a water company could have if privatised and also the possible health risk that, perhaps, could not be checked easily otherwise. Here, as well, several new trends can be observed. In the United Kingdom, the water companies have been privatised, following the trend of deregulation. Prices are fixed for a certain period of time. When deciding prices, one factor used is the retail price index of the cost of living and another factor, which concerns the comparative quality of service, offered by the supplier (according to a benchmark analysis).

In France, local governments or provincial governments own the network. Water companies can sign a contract for a fixed period. French water companies, in general, have a high level of efficiency, which is why these companies tend to score higher than British companies when a concession is granted. One disadvantage of the French system, however, is that national contracts are rare. The Dutch drinking water sector favours the French system, if competition in the drinking-water sector is admitted. Major actors in the Dutch water-market, like the NUON, will be able to achieve more synergy advantages, as a result of vertical integration, for example, in the maintenance of the network. Nevertheless, a reliable mechanism for the regulation of prices will be necessary and it is also essential that the law stipulates the actors who will be responsible for the supervision of the water supply. A committee of inspection could be established for the quality of water and an authority in the field of competition could supervise the fair pricing of water.

CONCLUSIONS

This article is an argument for a more elaborate use of economic analysis within decision-making concerning water management. Striving for cost-effectiveness often results in an inefficient use of water. Water can be regarded as an essential asset, which is not any different from other vital assets such as bread. An important step in this process is the analysis of the influence of different tariff structures. When tracing the price sensitivity of water for different uses or different parts of society, synthesis techniques, such as meta-analysis, can play an important role.

It is to be expected that further privatisation of the water companies will increase the efficiency of the production of water. The French system, because of the reduction in the number of water companies and, because of the related increase in scaling-up, seems to be a reasonable and interesting alternative. Clearly,

governments need to guarantee a suitable controlling system for water quality.

The final conclusion is that the supply and demand of water is a very complex matter. A justified price setting is not easy to find. Moreover, in most cases, there is a linear relation between the water from the network and the amount of wastewater, which, in principle, might allow for an incorporation of charges for wastewater in the pricing system. In this way greater efficiency, more transparency, and better co-ordination can be achieved through a water board, which could then provide an integrated water bill, which is used in some countries (for example in Denmark). In various countries, there have already been proposals for projects which would combine water consumption, the refuse collection rate and the surface water tax for the purification of the surface water all on one bill. If the consumer had only to pay for the water consumption and the refuse collection rate ('small water bill'), the size of the bill would depend on the amount of water use. If, on the other hand, there were a combination of all three, water consumption, refuse collection rate and the surface water tax, a 'broad water bill', the costs for the purification of the water would also be linked to consumption. The latter, however, is more complicated and may also lead to duplication of taxes. Plans to execute this in the Netherlands have been temporarily abandoned, as owners of houses in one county would not be treated equally for the experiment. It is most likely that the last word about this matter has not been said in Europe.

As should be clear from the above, there are a growing number of initiatives for a more economic-based view in water management. In the near future, clear success can only be expected to a very limited degree. In principle, the growing scarcity of water can be taken into account in a more responsible way on the basis of a sound economic analysis.

REFERENCES

Dalhuisen, J.M., de Groot, H.L.F. and Nijkamp, P., (2000a), 'The Economics of Water: A Survey of Issues', in *International Journal of Development Planning Literature*, No.1, January-March, pp 3-20.

Dalhuisen, J.M., Florax, R.J.G.M., de Groot, H.L.F. and Nijkamp P., (2000b), *Price and Income Elasticities of Residential Water Demand: Why empirical estimates differ*, Research Memorandum, Vrije Universiteit Amsterdam, forthcoming.

Hewitt, J.A., and Hanemann, W.M., (1995), 'A Discrete/Continuous Approach to Residential Water Demand under Block Rate Pricing', in *Land Economics*, May 1995, Volume 71, No. 2, pp.173-192.

Jones, S., (2000), De Water Industrie in Engeland and Wales, *ESB Dossier,* June, pp. D11-D13 [in Dutch].

Tweede Kamer der Staten-Generaal (Dutch Parliament), Kamerstuk 25 869, *Herziening Waterleidingwet, Verslag van het Algemeen overleg op 14 oktober 1999,* [in Dutch].

Vereniging van Exploitanten van Waterleiding bedrijven in Nederland (VEWIN), (1999), *Water in Zicht, Benchmarking in de Drinkwatersector, VEWIN, Rijswijk* [in Dutch].

The environmental impact of water charges: agricultural water management policies in Bulgaria, Hungary, Romania and Slovakia[1]

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1. INTRODUCTION

This review of water pricing policies in four selected CEE countries (Bulgaria, Hungary, Romania and Slovakia) analyses the impact of changes in these policies on the environment. Basin over-flooding and runoff irrigation systems have been and remain most commonly used in the selected countries. This, together with inappropriate system maintenance, is one of the main causes of low irrigation efficiency.

Irrigation produces both beneficial and adverse effects on the environment. The first group of effects includes (i) the increase of groundwater recharging capability, (ii) regulation of flows within the river basin and (iii) improved restoration capacities of neighboring wetlands. The adverse environmental impacts of irrigation are mainly related to the effects on water quality and quantity, soil and water pollution status or river hydrology.

2. ENVIRONMENTAL IMPACT OF AGRICULTURAL WATER CHARGES

The environmental impact of agricultural water charges is influenced by the response price of farmers. The farmers adapt their policies so as to maximize their profit from irrigation water. The main questions in analysing the impact of the water charge are: to what extent and to what price do the farmers respond?

Economic theory suggests that farmers respond to changes in the water rate but not to changes in the fixed charge. Once the farmer has paid the fixed charge, he can use as much water as he wishes.

The farmer's sensitivity to changes in the fixed charge increases as the total water bill makes up a larger proportion of the total costs thus decreasing the overall profitability of the farming operation.

Response price = (average price +water rate)/2. The average price is the total revenue divided by the total water volume delivered. Elasticity tells us how much water demand is going to change for a given change in price.

By analysing elasticity and the factors influencing elasticity, we may find out how much water demand is going to change for a given change in price.

Surface water and groundwater have different prices. For example, in Romania, lower prices for surface water (1.5 times) encourage the use of surface water in the economic sectors, keeping good quality groundwater for household needs and human consumption. The demand for irrigation water in 1999 decreased by almost 30 percent as a result of the pricing policy.

1. This paper is based on a study funded by the REC. For more information on the result of the study, please contact Stefan Speck, Tel: (36-26) 505-056, Fax: (36-26) 311-294, E-mail: sspeck@rec.org.

2.1 Incentive pricing will have great impact on water use over the coming years

The new incentive pricing policy will have a great impact on water use in the next several years. In all selected countries, farmers have chosen to change the type of irrigation system or crop grown in response. Elasticity is much lower in the short term than in the long term. Farmers have less flexibility to adjust water use over the course of one season than over several seasons. During one season, the farmer can only respond by reducing water for crops if the crops tolerate less water. However, in the long run the farmers can change the type of irrigation system or crop grown.

Since the dissolution of the co-operative systems and the deterioration of the irrigation system in Bulgaria, irrigation is practiced on only 50 percent of the irrigable area. This, together with a reduction in market opportunities, has led to a change in the type of crops grown, especially a switch away from vegetable and fruit production. Rain-fed crops, notably wheat, barley and oil seeds dominated the rain-fed areas. Current levels of inputs and yields on rain fed crops are lower than possible because of relatively low output prices and relatively high input prices. The effects of this change may be measurable after some years.

2.2 Prices of agricultural produce

The rise in irrigation prices increases the prices of agricultural produce, which diminishes sales. The market for agricultural produce is not sufficiently large and competition at a national level is also significant because unemployment is high and people return from the cities to the villages.

As a consequence of the unclear agricultural development strategy for Romania, there is not much incentive for the increase of agricultural production or for irrigation. In addition, because of the small size of holdings (two to three hectares), farmers are primarily interested in providing food for their families which does not require intense cultivation.

Therefore, we consider that a significant increase in irrigation water price will lead to a further decrease in irrigation activity. Additionally, a decrease of the irrigation water price would require an important financial effort from the state budget.

2.3 Availability of other water sources

The availability of other water sources is an important concern. If the farmer can switch to other water sources, such as ground water wells, the relative cost of the alternative water source will affect the elasticity. Therefore, elasticity is higher for farmers with alternative sources of water. Again, in all situations, there is real competition from private wells with irrigation schemes. For example, in Bulgaria, gravity water was made available cost-free during the period July 12 – August 31, 2000, which significantly affected water levels in the reservoirs and the aquifers. Private wells dug by water users (BGL 300 or EUR 153) represent serious competition for the Katunica Irrigation Water User Association (KIWUA). The KIWUA has a total cultivated area of 1510 hectares (ha) of which about 1000 ha are irrigable gravitationally. The water sources include the river Chaya, ground water and private wells. Water use, not exceeding 0.2 litres per second but of less than ten cubic meters per day, is cost-free but it is difficult to regulate; this is an

important issue in the decision-making process.

In Romania, at the Titu-Ogrezeni-Jugureni-Corbii Mari irrigation system the farmers take water illegally from the open transporting canals. The Dambovita and Giurgiu branch of the National Society of Land Reclamation have no personnel or authority to stop this kind of illegal activity, nor is there any legal framework to stop this phenomenon.

Presently, minimum prices for irrigation water (established at a national level) in the given area, are as following:

- ROL 209,944/1000 m^3 for open canals without pumping;
- ROL 257,161/1000 m^3 at the hydrant without pumping.

The price of raw water destined for irrigation purposes is ROL 11,500/1000m^3 (USD 1 = 23,000 ROL); the small influence generated by this component is obvious.

In all cases, efforts are undertaken to construct weirs, canal lining and retaining walls in order to maximize efficiency. It is expected that the construction of division boxes will help improve water distribution. In addition, improvement in water availability and distribution increased cropping intensity and yields per hectare, raising the incomes of farmers.

2.4 Absence of metering

The absence of metering and the impossibility of measuring exact consumption are main concerns in all selected countries. Moreover, the absence of water meters precludes the implementation of volumetric pricing. The lack of water meters is due to their expense. Currently, in many situations, metering does not represent a practical or economic option and alternative technologies are required for assessing current water use. In fact, metering is a political issue.

2.5 Price structure and level

Theoretically, the weight of the variable element (i.e. volumetric rate, pollution rate) in the price structure needs to be balanced against the need to ensure the recovery of financial costs. A water price set at a level that ensures the recovery of costs should lead to an effective reduction in consumption and pollution.

In Bulgaria, water pricing covers the running costs only: starting from December 31, 2000, there will be no fee for water abstraction. In Romania, the price level influences the farmers' decision to use water either from the river or reservoirs or from groundwater sources. The structure of the water price allows irrigation water price to be subsidised in Slovakia, Romania, Bulgaria and partially in Hungary.

2.6 Conditions imposed in the environmental license

As an element of licensing, farmers may be asked to use alternative water sources, which also influences the water levels of aquifers. In Romania and Slovakia, water users are requested to use surface water sources.

2.7 Crop value, intensity and diversification

The redesign of irrigation systems, initiated in all analysed countries, was intended to achieve an increased cropping intensity and crop diversification

through a more efficient and effective use of water while supporting self-reliance in the organization and management of farmer-managed irrigation systems. Agricultural development must be better integrated with irrigation development.

When farmers are growing low value crops, such as pasture and hay, an increase in irrigation water rates may significantly decrease profitability.

2.8 Ability to change crops

The ability to select crops according to the climate, soils and market conditions allows farmers to diversify. The main problems are: (i) the low prices, (ii) the lack of markets for the products and (iii) the high prices of herbicides and fertilizers. The reduction in market opportunities has led to a change in the type of the crops grown especially to a switch away from vegetable and fruit production to rain fed crops, notably wheat.

2.9 Ability to change technology

Farmers may switch to less efficient but much cheaper irrigation technologies. The greater the ability to introduce new technologies, the higher the elasticity.

The financial accounts of the three last years 1997, 1998 and 1999 show that the loss of KIWUA came to BGL 923 (EUR 470) in 1999.

The average irrigation water price is BGL 50/ha or EUR 25.5/ha. The official irrigation water price of KIWUA is BGL 40 per hectare per watering or EUR 20.41/ha/watering for watermelon areas and BGL 60/ha/watering or EUR 30.61/ha/watering for all other crops.

2.10 High production costs

Within the accession countries to EU, production costs of the agricultural sector are largely influenced by the varying application of the cost recovery approach. If production costs are high, water costs are only a small percentage of total costs. Even when the water rates increase, there will be only a small increase in the total cost. Elasticity is low. This influences the competitiveness of the sector. In addition, a rigorous recovery of all costs would have an effect on the affordability of water services for rural communities, which are not yet willing to pay increased water prices.

2.11 Reduction of pollution

Reduction in emissions of pollutants is very evident in all selected countries in the Danube river basin. Studies revealed that about 44 percent of the total nitrogen input stems from agriculture and 58 percent in the case of phosphorus. The new economic mechanisms, introduced in each of the selected countries, contributed to a reduction of about 60 percent in the total nutrient content.

A recent Government Decision in Romania (GD 472/2000) established penalties of four to five percent of the total farm revenues for polluting water resources. Through the application of this regulation, N and P have been reduced by more than 50 percent.

Identifying the culprit causing diffuse pollution in agriculture is fundamental to effectiveness. The individual farmer who pollutes must pay, based on the 'polluter pays' principle.

3. KEY ISSUES THAT EXPLAIN THE EFFECTIVENESS OF PRICING FOR THE ENVIROMENT

The effectiveness of pricing for the environment depends on:

- The development and implementation of the pricing policy;
- The creation of water user associations in agriculture as an essential tool for the implementation of pricing reform;
- Characteristics of the demand, in relation to the effective use of available water supply and improved system and water supply reliability;
- Characteristics of physical environment, in reducing drainage and erosion control impacts, improving water quality and aquatic habitat;
- The combination of pricing with organizational, managerial, financial and economic concerns, including strengthening communication with stakeholders as a key link in developing the necessary understanding and support for new goals and policies.

3.1 The development and implementation of pricing policy

Bulgaria has recently developed a policy paper, Strategy for Irrigation Development in Bulgaria Under Market Economy Conditions. The strategy outlines the aims and scope of the required structural reforms in irrigation and the ways its management can adapt to new conditions in agriculture. The areas equipped for irrigation, in which irrigation is profitable or can become profitable within reasonable time limits, are also described, by region and in the country as a whole. The strategy also sets the main development priorities, the methods and organization of infrastructure use, and the objectives of the economic, pricing and investment policies in the sector for both short- and long-term.

A program declaration of the Slovakian Government in 1998 is the main document concerning agricultural policy.

The creation of Water User Associations in agriculture is essential for the implementation of pricing reform in all selected countries.

3.2 Characteristics of the demand

Like the farmer's demand for any other input, the demand for water reflects how valuable water is in production. Irrigation water derives its value from the contribution it makes to farm profits. When additional water is available with no cost, the farmer will apply more water until there is no additional benefit to be gained from doing so. At this point the farmer will maximize profit but may harm others by taking water that would otherwise be used by a water-short farmer.

The basic principle of incentive pricing is to set the water price to discourage inefficient use of water. Efficient water pricing will guarantee that water infrastructures can be adequately managed.

For all selected case studies, the application of new water distribution schemes and relevant pricing mechanisms which in the long-term shall fully reflect water supply costs will allow water quality conservation and guarantee equitability in satisfying user requirements.

3.3 Character of the physical environment

The character of the physical environment acts as a beneficial or restrictive factor on the production capacity of agricultural soils in the selected case studies. Frequent droughts, soil excess, soil erosion and landslides, wind erosion or soil chemical pollution strongly influence the effectiveness of a pricing system. The application of an efficient pricing mechanism will facilitate improvements in drainage, erosion reduction, improved water quality and a better aquatic habitat.

3.4 Combination of pricing with other measures

Proper pricing policy is a limited solution, encouraging a rational approach to irrigation water use. When it is combined with institutional reforms and the enforcement of legislation, a sustainable agricultural sector and a well-protected environment can be achieved.

Envisaged organizational, managerial, financial and economic measures are correlated with contemporary policy principles of integrated and sustainable water management and use. Reflecting historic and regional conditions, they aim at better demand management to improve effectiveness; the decentralization of responsibility and the adoption of the river basin as the basic management unit; a participatory approach; the implementation of conservation activities; regional flexibility, etc.

Institutional restructuring and the development of new relations among stakeholders in irrigation and drainage will make it easier for water users to participate in decision-making at all levels. Their role and understanding of their responsibilities must be increased.

Efforts should be made to change public perceptions that agriculture wastes water through public awareness campaigns. Users should understand that the new water rates must recover all costs.

The case studies made clear that the proposed Water Framework Directive offers an appropriate framework to ensure that the environmental, economic and social objectives are met cost-effectively through the preparation of river basin management plans to facilitate the integration of pricing policies with other measures. The management of the Tisza river basin could be the most appropriate example for all selected countries. Water pricing is as an essential instrument of the Tisza river basin management plan.

Finally, communication between stakeholders is a key issue in developing the necessary understanding and support for new policies and approaches. Through involving farmers in the process, the following objectives can be achieved:

- Establishment of credibility;
- Identification of farmers' concerns and values;
- Development of a consensus between the irrigation scheme and its customers.

3.5 Water measurement and accounting systems

A reliable water measurement and accounting system will facilitate:

- Conservation tasks;
- Changes in the use of water;
- Changes in users' perception of water waste.

3.6 Agricultural crops planning

Agricultural policies may strongly affect the environment through their impacts on pricing strategy. Better planning of agricultural crops will allow a better use of irrigation water. The selection of crops maximally suited to the individual irrigation system is vital.

3.7 Participation improves planning

The clearest and most consistent benefits of participation in irrigation management have come from involving farmers in planning. The main focus needs to be on the use of dialogue to learn about local priorities and obtain local information on things such as past delivery problems, flooding patterns and land tenure which can inform the design of structures and canals. In addition to activities during the design phase, meetings at the beginning of construction provide a good opportunity to review issues, prevent problems and optimize the use of local materials and labor.

In all selected countries, already existing river basin committees or councils facilitate the implementation of a bottom-up approach to water pricing through public participation and transparent procedures.

Pricing policies for enhancing the sustainability of water resources[1]

Pierre Strosser, DG Environment, European Commission[2]

Water is of major concern for environmental policies in the European Community and is one of the environmental priorities of the European Commission. The main pillar of water policies during the coming decades will be the establishment of a framework for Community action in the field of water policy (i.e. the Water Framework Directive).

In line with recent initiatives giving more weight to economic instruments in environmental policies, the Water Framework Directive promotes the use of water charging as an incentive for the sustainable use of water resources and the recovery of the costs of water services by the economic sector. This will contribute to meeting the environmental objectives of this directive in a cost-effective way.

Against this background, the Commission has adopted a Communication entitled Pricing Policies for Enhancing the Sustainability of Water Resources (COM(2000)477) with the following objectives:

1. To clarify the main issues related to the use of water pricing for enhancing the sustainability of water resources;

2. To present the rationale behind the Commission's preference for a strict application of sound economic and environmental principles in water pricing policies;

3. To propose a set of guiding principles that will support the implementation of the proposed Water Framework Directive and more specifically its water pricing article.

The key messages put forward by the Communication are as follows.[3]

1. The sustainability of water resources is at stake in many river basins in Europe, from both a quantitative and qualitative point of view. Appropriate water pricing has a key role to play in the development of sustainable water policies.

2. To play an effective role in enhancing the sustainability of water resources, water pricing policies need to be based on an assessment of the costs and benefits of water use and consider both the financial costs of providing services as well as the environmental and resource costs. A price directly

1. This text is a slightly modified version of the preface of the Communication by the Commission to the Council, the European Parliament and the Economic and Social Committee, COM(2000)477.

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3. See also the accompanying document to the Communication entitled *Water pricing policies in theory and practice* SEC(2000)1237.

linked to the volumes of water used or pollution produced can ensure that pricing has a clear incentive function for consumers to improve water use efficiency and reduce pollution.

3. The integration of economic and environmental objectives into Member States' water pricing policies is highly diverse at present. Overall, the full recovery of financial costs is only partly achieved, and environmental and resource costs are rarely considered. The inadequacy of water pricing policies is striking for the agricultural sector, especially in Southern European countries where it is by far the largest consumer of water and where scarcity problems are the greatest.

4. Water pricing policies in countries where the EU has a particularly strong involvement rarely integrate economic efficiency and environmental objectives. This is true for Accession Countries, where pricing is an important issue in the context of enlargement. It is even more valid for developing countries, where the application of economic principles in water policies is in its infancy.

5. Efficient water pricing policies have a demonstrable impact on the water demand of different uses. As a result of changes in water demand, efficient water pricing reduces the pressure on water resources. This is particularly true for the agricultural sector. The available evidence suggests that farming communities can be expected to adapt to certain price increases that would result from a stricter recovery of the costs of water services. Different levels of cost recovery among countries and economic sectors, such as agriculture and industry, are likely to influence the competitiveness of these sectors both in the internal market and international trade.

6. Pricing policies that better account for the environment will build on: (i) a firmer application of the principle of recovery of costs; (ii) a wider application of pricing structures that provide incentives and the promotion of metering devices; (iii) the assessment of major environmental costs and, where feasible, the internalisation of these costs into prices; (iv) a transparent policy development process with the participation of users/consumers; and, (v) a phased implementation of pricing policies that better integrate sound economic and environmental principles.

7. Water pricing will need to be integrated with other measures to ensure environmental, economic and social objectives are met cost-effectively. The proposed Water Framework Directive provides the right structure to do so in the context of the preparation of the river basin management plans.

8. Other sector, structural and cohesion policies need to be designed and implemented so as to ensure consistency and coherence with, and effectiveness of, water pricing policies. As far as agriculture is concerned, reconciling water and agriculture remains a key priority for the Common Agricultural Policy (CAP) and existing policy instruments (e.g. agri-environmental measures in rural development programmes). The CAP should support the sustainable use of water resources in line with the economic and environmental principles promoted in the proposed Water Framework Directive and in this communication.

The Commission fully recognises the sensitivity of the pricing issues discussed in this communication for a wide range of stakeholders and Member States. This sensitivity should not be a reason for misreading the Commission's message as an advocacy for a 'pricing alone' policy. Clearly, pricing is not the sole instrument that can (and will) solve water resources problems in Europe and elsewhere. However, pricing should be given due consideration to ensure it promotes more efficient and less polluting use of our scarce water resources.

Overall, the communication aims at provoking a fruitful political debate and sharing of views that will lead to the identification of practical steps and development of guidelines for the implementation of the water pricing article of the proposed Water Framework Directive. And the communication is hoped to play an information role for stakeholders who will actively participate in the preparation of the river basin management plans and programmes of measures provided for by the Water Framework Directive.

The communication will also support the assessment of the role water pricing may play in the context of enlargement and the implementation of the environmental *acquis* in Accession Countries. Finally, it will supplement the EU guidelines for development policy entitled Towards Sustainable Water Resources Management by stressing the key components of sustainable water pricing policies.

Environmental Development Fund of Slovenia: economic instruments and water policies

Igor Cehovin, Environmental Development Fund of Slovenia

Summary

The Environmental Development Fund of Slovenia (the 'Fund') provides soft loans for environmental protection investments, on the basis of public tender. The main priorities for the allocation of funds are:

- Investment in environmenal preservation and development initiatives;
- Environmental soundness;
- Efficiency relative to the size of the investment;
- Financial viability.

The Fund carrys out its mission by awarding loans through three separate loan programs. These are:

- The loan program for local infrastructure, which targets the environmental investments of municipalities or actors in the public services, for example, sewage/waste water treatment systems, solid waste disposals, drinking water suppliers, etc;
- The loan program for environmental investments in industry, which supports projects expanding the use of environmental protection equipment and technology, environmentally sound technology and products, and the realization of corrective programs;
- The air pollution reduction program, financing investments which encourage cleaner heating energy sources, the creation of heating facilities using renewable sources of energy and the installation of more environmentally friendly heating systems in new buildings.

Prices in the water sector were administratively controlled in the past. Nowadays, the price fixing mechanisms embrace market principles much more.

1. ENVIRONMENTAL DEVELOPMENT FUND OF SLOVENIA

1.1 General

The Environmental Development Fund of Slovenia was established under the Environmental Protection Act of 1993 as a public legal entity with SIT 10 million of initial capital. The statute of the Fund was issued in the middle of 1994. The Fund actually began operating at the end of 1994, the same year the first staff members were employed. In 1995, the Fund's standing orders for the procedures and con-

ditions of the distribution of funds were adopted and published in the Official Gazette. The Fund's capital increased in 1994, 1995 and 1996 through the transfer of unpaid loan receivables from the Ministry of Environment and Spatial Planning (MESP). These loans were previously granted by the MESP.

The Fund is a non-profit financial organization, channelling finance for environmental investment projects. The basic goal of the Fund is to provide loans on preferential terms for investment activities in the field of environmental protection from its own capital and from capital obtained from other sources. Revenues generated from the interest rate on loans should allow the Fund to maintain the real value of its capital and cover the operational costs of the Fund without profit.

The Fund provides loans on the basis of public announcement (i.e., tendering procedure) for purposes accepted as priorities by the Environmental Protection Act and in the National Environmental Protection Program (NEAP).

1.2 Eco Fund's procedures

The first task of the Fund is the annual investment policy, adopted by the administrative board and confirmed by the government, in which the general outline of tenders for the given year is defined. After adopting the annual investment policy, the administrative board appoints a Committee for Public Tender Implementation, which is composed of at least three members, including a minimum of one representative of the MEPP.

The committee is responsible for the entire tender preparation and loan-approval procedure, including: the preparation of the contents of public tenders; the acceptance of applications and decisions on their formal eligibility; the evaluation of applications and preparation of a priority list; and the approval of funds available.

When preparing a tender, the committee defines the object of the tender (i.e. type of project eligible for financing) and the amount of money to be available under the tender. It specifies the conditions for loan provision, the requirements for loan insurance (i.e. collateral), and the contents of the application to be submitted by applicants. The committee establishes the time limit and manner of application and communicates relevant information to applicants.

The next step is the evaluation of all applications received. The evaluation criteria are:

- Contribution to the preservation and development of the environment;
- Environmental soundness;
- Efficiency relative to investment costs;
- Financial viability.

Loans are approved and contracts signed after the evaluation of applications. The transfer of capital starts following the submission of appropriate collateral. Funds are transferred as individual phases of the project are completed.

The Fund supervises the progress of the investment and monitors the environmental results of the investment three years after its completion.

TABLE 1

Industrial projects funded by Environmental Development Fund, Slovenia 1996-2000

Prices in millions, Slovenian tolar (SIT)

Public tender	*Amount approved*	*Amount paid*	*Number of approved loans*
04-IN96A	286	86	3
07-IN96B	39	12	2
10-IN97A	152	119	5
13-IN98A	1,469	1,469	19
14-IN98B	748	748	9
17-IN99A	4,597	4,395	15
20-IN00A incomplete	-	-	-
Total	**7,291**	**6,829**	**53**

TABLE 2

Local infrastructure projects funded by Environmental Development Fund, Slovenia 1996-2000

Prices in millions, Slovenian tolar (SIT)

Public tender	*Amount approved*	*Amount paid*	*Number of approved loans*
02-LI95	691	619	54
06-LI96	758	738	31
09-LI97A	1,200	1,124	36
12-LI98A	450	308	15
15-LI99A	1,935	1,762	36
18-LI00A	1,119	853	20
Total	**7,291**	**6,829**	**53**

1.3 Description of the Fund's projects

1.3.1 Ozone depleting substances phaseout project

The Fund can function as a financial intermediary. It was appointed by the government of Slovenia to act as a financial agent carrying out the supervision of the implementation of the Ozone Depleting Substances Phaseout Project financed by a grant from the Global Environmental Facility Trust Fund.

The Global Environment Facility Trust Fund gave a grant of USD 6.2 million to six Slovene companies in order to replace ozone-depleting technologies. The Fund behaved as a financial intermediary ensuring proper procedures for collection and payment. The project was completed successfully in 1998.

1.3.2 Air pollution reduction program (APRP)

In June 1996, the Fund signed a loan agreement for DEM 30 million with the World Bank in order to finance the conversion of polluting heating systems. The

Fund participated with its own resources: twenty-five percent of each loan is given by the Fund and 75 percent by the World Bank. Approximately SIT 4 billion (DEM 40 million) has been extended to 4,819 households and 65 boiler houses since September 1995 (even prior to the World Bank loan).

Soft loans have been granted for:

- Conversion from dirty solid fuels and heavy oils to more environmentally friendly sources of energy, such as natural gas;
- Creation of heating facilities using renewable sources of energy; and
- Installation of more environmentally friendly heating systems in new buildings.

1.3.3 Industrial projects, reduction of pollution

The Fund started financing environmental projects in the industrial sector in 1996. The Fund has announced seven public tenders to finance the purchase of equipment and technology for environmental protection, investments in environmentally friendly technologies and products, and for the implementation of regenerative environmental programs. The detailed data on each public tender can be found in Tables 1 and 2.

The public invitation to apply for loans covering the environmental investments of companies (13IN98A) meant the execution of the Environmental Credit Scheme project. Fifty percent of finance came from EU Phare grant funds.

The public tender 17IN99A was very successful. The amount available for loan increased twice and it was closed one month ahead of schedule.

1.3.4 Local infrastructure projects

The Fund gives soft loans to public environmental protection services where the actual borrowers are municipalities, municipal enterprises or other companies performing such public services.

The Fund has announced six tenders for municipalities and municipal service companies. Loans have been sought for investment projects in sewage/waste water treatment systems, solid waste disposal, drinking water supply, etc.

Detailed data for each public tender are seen in Table 3 opposite.

Public tender 18-LI00A was announced in January 2000 and will be open until the end of the year 2000. The next table and picture show a breakdown of all approved loans by purpose.

2. FIXING OF PRICES FOR THE PUBLIC SERVICES

2.1 Historical view

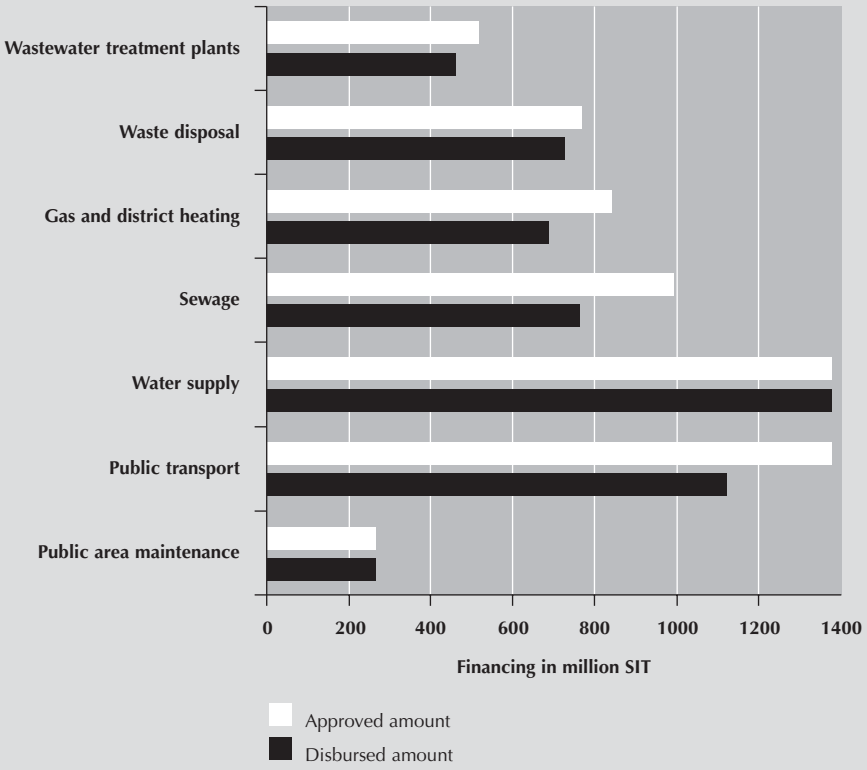
Until 1989, most municipal services were carried out by local public enterprises. Each municipality had a special consumer-worker council concerned with local public services and consisting of representatives from all local public enterprises. In principle, this council set prices for the services provided by local public enterprises. In practice, the state had a great deal of formal and informal influence, endeavouring to keep public service prices down. The councils were dissolved in 1989 by an amendment to the constitution. One of the first acts of the newly independent Slovenia in 1991 was to pass the Law on Prices, which

TABLE 3

Loans approved by the Environmental Development Fund, Slovenia

Prices in million Slovenian tolar

Purpose of investments	*Amount approved*	*Amount paid*	*Share*
Wastewater treatment plants	537	462	8.7
Waste disposal	764	727	12.4
Gas and district heating	841	694	13.7
Sewage	996	762	16.2
Water supply	1,370	1,370	22.3
Public transport	1,377	1,121	22.4
Public area maintaining	268	268	4.3
Total	**6,153**	**5,404**	**100.0**



allowed the government to transfer public-service price-setting authority to the municipalities. This law was followed by a number of such decrees for specific municipal services.

This experiment in municipal price setting was curtailed after about six months when municipal service prices were frozen on January 1, 1992. Thereafter increases were permitted only on the approval of the Ministry of Economic Affairs. The most common approach was permitting municipal service prices to rise at 80 percent of the general price inflation rate (as determined by the retail price index). Most public service entities could not define or set prices, independently, based on business activities and market principles. This was especially true for public services active in the distribution of drinking water, waste disposal, and in all kind of activities with wastewater, etc. The government reviews the maximum prices every four months.

In October 1997, the new Fixed Prices Regulation was adopted. The regulation has the following objectives:

- To stabilize the then market prices as the maximum prices;
- Payment conditions cannot be changed in the future;
- Delivery and procurement conditions cannot be changed in the future;
- Individuals that perform public services can be subsidized, etc.

If a company ascertains that the fixed prices do not allow profit, it can demand the government to raise the prices. This procedure is however rather difficult and therefore not very common.

Further, the Law on Prices allows companies that cannot obtain adequate revenue from their commercial activities to apply for a subsidy.

Local government cannot change fixed prices. All municipal services must respect the maximum prices. Only if the local government set municipal taxes before the regulation was issued can the companies performing public services raise their prices but, even then, only to the level fixed by the regulation. Local governments can prescribe a special tax for environmental stress. The Environmental Protection Act is the legal basis for such acts (separate decrees for specific areas: drinking and sewage water, waste disposal, air, etc.). Municipal statutes also usually allow such taxes.

Taxes are charged and collected at the same time as the service is charged. Their purpose is not to pay for the service. The amount of the taxes may differ from one municipality to the other and so does the aggregate price for municipal services. Usually, however, the price for the relevant service does not differ.

The main issue in Slovenia is that users do not pay the full costs of the services they receive. The term 'service they receive' should also include expenses that will expand production (so that the service can be successfully performed in the future).

Services cannot reach a higher level of quality as the charges only meet production costs and generate no funds for new investments. Thus, users do not know the legitimate price for the services that are provided to them. Consciousness of users regarding environmental protection can be low as a result of this ignorance.

This pricing policy, which allows such a discrepancy between actual costs and imposed prices, causes a number of problems for the normal functioning of municipal service:

- The quality of municipal services is low;
- There is no new development and no modern equipment;
- It is not possible to work in accordance with BAT;
- Budget funds vary from municipality to municipality;
- A proper information system has not yet been developed.

2.2 Instructions for the formulation of prices

In January 2000, the Minister of Environment and Spatial Planning published the Instructions for the Formulation of Prices of Drinking Water Supply Services by Compulsory Local Public Services

The instructions set two types of prices:

- The in-house price of services is the price that covers the costs of the existing method of supplying drinking water.
- The justified price of services is the in-house price of services plus the minimum costs that ensure the execution of a program to guarantee the prescribed quality of drinking water and the supply of drinking water.

The following costs shall be covered by the in-house and justified prices:

- Direct costs: cost of electrical energy, cost of fuel, other material costs, cost of services, labor costs, direct sales costs, other direct costs;
- Indirect production costs: depreciation, investment maintenance, other indirect production costs;
- General costs: indirect supply costs, indirect administrative costs, indirect sales costs, indirect interest costs;
- Profit.

The justified price shall be charged for services if the existing method of supplying drinking water is inadequate and the local community has formulated a program to achieve a supply of drinking water appropriate to central guidelines. In the same manner, the justified price of services shall be charged in order to finance the replacement of worn-out sections of the network thus reducing water losses in the water supply network.

The difference between the justified and in-house prices shall be formulated on the basis of the estimated costs of the program for achieving the prescribed supply of drinking water and the timetable envisaged for its execution.

The revenues generated by the difference between the justified and in-house prices may be used only for the expansion of the drinking water supply.

At the present time, prices for water are determined at the municipal level. It is expected that the prices will approach real market levels in the future. According

to the statistics and to the report made by the MESP, the municipal services do not reach high levels of quality, at present, presumably due to the low prices charged. If the prices are to be set on the basis of market levels, they will most probably rise. Such an increase in prices will allow a higher quality of public services as a positive consequence. However, a rise in inflation and a consequent rise of interest rates could ensue.

Nevertheless, the mainstream economic view is that this policy will not lead to a rise in inflation. The rate of inflation is determined by macroeconomic variables such as the money supply, fiscal deficit, exchange rate, etc. For a given package of such policies, micro-economic control of individual prices simply makes other prices increase in an offsetting fashion with no impact on true inflation but a high cost in economic inefficiency. Even if this view were inaccurate, the price of municipal services is thought to be minor as a component of the average consumer's market basket so its control would only have the most modest overall impact.

3. CONCLUSION

The Fund has no direct influence on pricing policies in the water sector. The Fund provides loans for environmental protection investments at favorable interest rates on the basis of application for tender. The main goal of the Fund is to support pollution reduction projects.

Administratively controlled prices had a positive influence on the inflation rate in the past. One of the main consequences of this policy has been a lack of funds for new investments and for covering maintenance costs. Nowadays market principles are much more involved in the price determination mechanisms.

REFERENCES

Provision of Technical Assistance in the Approximation of the Urban Wastewater Treatment Directive, Draft Final Report, Ljubljana, December 1998.

'Instructions for Formulation of Prices of Drinking Water Supply Services by Compulsory Local Public Services' in *Official Gazette RS*, Ljubljana, 2000.

Zuzek, L., Vidic, V., (1999), 'Slovenia: The Environmental Development Fund', in *Sourcebook on Environmental Funds in Economies in Transition*, OECD: Paris.

What role for water pricing: ten actions for internalising sustainability

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This paper presents suggested actions for ensuring that the future implementation of the Water Framework Directive — in Central and Eastern Europe as well as in the current Member States of the European Union — pursues the specified path of sustainability and achieves it.

In the opinion of the authors, water pricing is a useful tool (or set of tools) for promoting and encouraging the fulfillment of the environmental objectives of the directive, but in itself is not the solution.

After a brief review of recent policy developments and events, the ten actions are presented, grouped into five broad headings: economic, financial, management, process, and integration. Particular attention is paid to the need for full internalisation of environmental costs into water pricing systems, with examples of wetland and floodplain goods and services in Estonia and Slovakia.

INTRODUCTION

WWF has for some time been engaged in the policy debate surrounding the development, and eventual adoption, of the Water Framework Directive. Furthermore, WWF's European Freshwater Program is organising a joint series of seminars with the European Commission, focusing on, for example, agriculture, wetlands and river basin management. This series aims at providing practical approaches and tools for the implementation of the directive, leading to the drafting of a non-statutory guidance document for river basin managers to be published by the end of 2001.

In Central and Eastern Europe, WWF has argued that the directive offers real potential for the promotion of sustainable approaches to environmental management and decision-making, for example within the countries of the Danube river basin (Avis and Weller 2000).

Water pricing is clearly a key element of this new policy. WWF supports the moves towards introducing proper water pricing, in that for too long the environment has been subsidising the provision of water at below full costs. This has been done mainly through habitat loss, ecosystem degradation, and wetland drainage. In Central and Eastern Europe (CEE) the relatively rich biodiversity, particularly wetland and floodplain habitats, is therefore at quite some risk unless water pricing acts to promote sustainability rather than to undermine it.

This paper identifies a series of actions, ten in total, which the authors of this paper believe are pre-requisites for the successful introduction of water pricing systems in CEE. These actions will lead to the development of sustainable water management practices, which WWF argues is really the underlying spirit of the new directive.

However, progress to date, in the existing Member States, regarding the design and introduction of water pricing strategies, has been rather limited. At the European Commission sponsored conference on pricing water in Sintra, Portugal (September 1999), more than 30 presentations were made from all over Europe: north, south, east and west. Only one (Tydeman 1999) concentrated on true, 'full' cost recovery, that is cost recovery which incorporates and takes account of the environmental cost of water supply, treatment, and management. This is rather disturbing, given that the recently published European Commission Communication on Pricing Policies for Enhancing the Sustainability of Water Resources specifically demands that environmental costs be integrated into water pricing strategies.

But much has happened in the twelve months since the Sintra Conference. Before presenting the ten key actions, some relevant recent policy developments or events are recalled, in order to set the scene.

- 02/2000, Brussels: first WWF/EC Seminar on the Implementation of the Water Framework Directive, with more than 100 participants, many of whom were from CEE.
- 02/2000, Budapest: first meeting of the Danube Convention (ICPDR) ad-hoc Expert Group on river basin management and the implementation of the Water Framework Directive.
- 07/2000, Brussels: publication of EC Communication on Pricing Policies for Enhancing the Sustainability of Water Resources.
- 09/2000, Brussels: European Parliament and Council of Ministers adopts Water Framework Directive following lengthy consultation procedures.
- 09/2000, Budapest: third meeting of ICPDR ad-hoc Expert Group on WFD agreed action program/timetable for compliance with directive (international aspects) in Danube basin countries, and proposes that a sub-group be formed to deal with economic issues.
- 09/2000, Lille: Conference on Water Pricing which discussed, *inter alia*, the development of guidelines on water pricing.
- 09/2000, Szentendre: EC/REC conference on water pricing, perhaps the first of its kind in CEE.

TEN ACTIONS FOR INTERNALISING SUSTAINABILITY

1. 'Economic'

1.1 Water must not be treated as just another economic good

Within this new policy and philosophical framework, water is treated as an economic good. This allows it to be priced, but not without controversy. Most objections to this notion, which often come from environmental groups, relate to questions over the guarantee of fair and equal distribution and access, particularly where water has been treated as a 'basic good' that has been provided by the state. How can the poor, it is asked, gain access to enough water to meet their basic requirements, if the supply and provision of water is left to the full force of the 'free' market?

This quite sympathetic objection, based loosely around a wider conception of water as one of the fundamental human rights, is seemingly unpragmatic, however. Somebody must bear the costs incurred for water provision and treatment and it cannot continue to be the environment through loss of ecosystem functioning nor hidden subsidies. Is there a serious alternative, in management and investment terms, to treating water as an economic commodity? In today's economic and political climate, the answer must be 'no', but, we need appropriate models. Many economists seem to treat water as they would any other commodity; but it is not.

In theory, while it is renewable, we are not treating it as such; no other product scores higher on the scale of human needs, it is therefore demand assured and, unlike other commodities, it is not replaceable and therefore not subject to standard market forces. The last ton of coal on the planet may become worth a considerable sum (but there are other energy sources), the last ton of available water would clearly not, since once we get to that level there would be few people around to take advantage, even the so-called 'fat cats' of the UK water industry.

Thus, whilst water is certainly to be treated as an economic good, it must be recognised that it is very different to other commodities and therefore exceptional strategies and instruments need to be developed in order to manage its pricing effectively.

1.2 Planning and pricing must ensure sustainable use, not just 'efficient use'

Article 9 of the directive states that, by 2010, governments should ensure 'water pricing policies [which] provide incentives for users to use water resources efficiently'. A distinction needs to be drawn here between 'efficient' and 'sustainable'.

If the overall goal of the emerging European Union policies is to ensure a sustainable Europe, then, clearly, water pricing should be used to ensure (long-term) sustainable use of water resources rather than simply (short-term) efficient use. This itself requires a fundamental realisation: that the environment is the service provider of water, but is often currently regarded at best as an alternative user. Until 'the environment' is recognised as the service provider *par excellence*, instead of being relegated to the status of 'user', it risks being ignored and therefore degraded by preference being given to other, more persuasive or powerful user groups or sectors. Sustainability, enshrined in the Amsterdam Treaty, needs proper definition in terms of water resources, such as that provided by Gleick (1996):

> The use of water that supports the ability of human society to endure and flourish into the indefinite future without undermining the integrity of the hydrological cycle or ecological systems that depend on it.

The development of sustainability goals and indicators is now a major policy priority and it requires emphasising the integrity of water resources and the flora, fauna and human societies that have developed around them. The management of river basins, aquifers, coastal zones and the marine environment have often been seen as separate problems but they are inextricably linked through the hydrological cycle. Also, concerns about the water quality of both freshwater and

sea water, historically treated as separate issues, must now be seen as requiring a unified management approach.

Water use efficiency needs to be increased, in particular that of the agricultural sector in regions suffering from 'water stress'. There are many such regions, particularly in southern Europe. According to the European Commission (2000: 7) 'over-abstraction of water has put the sustainability of many aquifers at stake' and that '50 percent of wetlands have 'endangered status' due to groundwater over-exploitation'.

However, this drive for efficiency should not constitute the ultimate aim of water pricing policies, as highly efficient water use does not necessarily imply sustainable use. For example, there are places in southern Europe where irrigation schemes are 90 percent efficient, but where there is still sever 'water stress' i.e. abstraction form groundwater is greater than recharge. In a paper delivered at the recent Lille conference, Maestu (2000) detailed such instances for modern, high-investment irrigation schemes in Spain. The study concludes that 'even where crop prices have been favourable and where investments in technical efficiency have taken place, there have not been improvements in the management of aquifers in the absence of a regulatory framework. The lack of incorporation of external effects into decision-making then leads to unsustainable water use'.

1.3 Full cost recovery for water services includes the costs of damages to the environment

As recognised in the Communication, where the costs of 'producing' water are considered, it is rare for anything but the internal costs to be taken into account i.e. those localised within a management unit (these include collection, transport, treatment and distribution). Even so, not always the full costs are taken into account; for example, maintenance of water treatment plants, which can have a very long lifespan, or maintenance of distribution systems are often ignored.

External costs, i.e. those excluding the above and which concern the community as a whole as a consequence of water use, are rarely taken into account. Such externalities include impact on the environment which effectively means that loss of nature is a subsidy to both suppliers and users of water, industry, agriculture, consumers.

In general terms, these come under the heading of 'ecosystem services', that is, the processes through which ecosystems and their component species sustain and fulfil human life. They maintain the production of ecosystem goods such as food, forage, timber, natural fibre and industrial products, as well as maintaining biodiversity. In addition, ecosystem services represent actual life support functions, such as cleansing, recycling and renewal as well as intangible aesthetic and cultural benefits.

Ecosystem services are generated by a complex of natural cycles including biogeochemical and hydrological cycles. Human beings depend completely on the continuation of these cycles for their very existence. The nature and value of these cycles have been noticed largely through their loss. For example deforestation has brought to light the critical role of forests in the hydrological cycle, in particular in mitigating floods, drought, and erosion. As

TABLE 1

Value and freshwater ecosystems

After Barbier, Acreman and Knowler, 1997

Direct use value	*Indirect use value*	*Quasi and quasi-option value*	*Existence value*
• Fish • Agriculture • Fuelwood • Recreation • Transport • Wildlife harvesting • Peat/energy	• Nutrient retention • Flood control • Storm protection • Groundwater recharge • External ecosystem support • Microclimate stabilisation • Shoreline stabilisation	• Potential future uses (as per direct and indirect use) • Future value of information	• Biodiversity • Culture, heritage

TABLE 2

Habitat values of Estonian wetlands and flood plains

After Andreasson-Gren, Ehrlich and Pedersen, 1999

Harvest values	*Recreational values*	*Life-support values*	*Biodiversity*
• Reeds • Grazing land for cattle and sheep • Fish	• Bird watching • Bathing • Sport fishing and hunting (which can also be regarded as harvest values) • Beautiful wetland nature scenery	• Nutrient cleaning • Waste assimilation • Flood protection • Wind protection • Ground water cleaning and provision • Biodiversity	• Functional diversity • Resilience • Information • Genetic pool

Daily (1997) put it: 'Society is likely to value more highly [ecosystem] services, and to discover (or rediscover) an array of services not listed, as human impacts on the environment intensify and the costs and limits of technological substitutions become more apparent'. The benefits provided by freshwater ecosystems have been characterised by Barbier, Acreman, and Knowler (1997) through economic valuation using a total economic value framework (TEV) (see Table 1).

Ecosystem services are critical, but, establishing direct links between human activities and losses of aquatic ecosystem services in specific locations is difficult and complex. When undertaking economic analyses, they are frequently omitted because they are not marketed or are difficult to price. Nevertheless when these services are lost, society is forced into 'defensive expenditure' to replace them.

An example from the United States is the Mississippi River valley where the draining of wetlands and alteration of river channels (at some significant original cost) destroyed a large portion of the river system's natural flood protection services. The loss of these services was partially responsible for the massive flooding that occurred during 1993 which caused property damage estimated at USD 12 million (Myers and White 1993). In addition to that cost, a considerably larger amount

is having to be spent in restoring the river to its original state. Elsewhere in the US, in a classic study, it was shown that the wetlands along the Charles River reduced the peak river flow by 65 percent, and delayed the peak flow from a particularly violent storm by 3 days (quoted in Turner, 1988).

WWF has undertaken specific research in this area, specifically with regard to two of its European sub-regional programmes — the Baltic (Andreasson-Gren, Ehrlich and Pedersen, 1999) and the Danube Carpathian (Andreasson-Gren and Groth, 1995). One of WWF's NGO partners in the region, Daphne of Slovakia, has also undertaken field-based economic analysis of wetland benefits (Rybanic, Seffer and Cierna 1999). Some results from these studies will be discussed briefly to highlight the costs which traditional water pricing systems have failed to integrate or 'internalise'.

The Baltic study concentrated on the very valuable Estonian coastal and floodplain wetlands. These are highly productive, both in terms of biodiversity and with respect to services of value to human society. Such wetlands help to regulate nutrient inputs thereby mitigating damage from eutrophication.

Estonian wetlands also help to reduce the effect of floods, and large surfaces of inundated flood plains make a considerable contribution to the qualitative and quantitative regeneration of groundwater. The climatic function of some types of wetlands can be very important as they affect the mesoclimate of nearby land by increasing evaporation and absorbing heat during periods of drought. Tracts of wetland forest can act as barriers against strong winds, thus preventing the drying up of agricultural land.

The study concluded that the Estonian coastal wetlands and floodplains are likely to produce the following, interlinked, classes and items of environmental services of use to society (Table 2).

While it is relatively easy to carry out quantification of harvest values and even recreational values, this is not the case with life support services or biodiversity. For life support services, this is because these services are usually obtained by humans through other ecosystems. For example, eutrophication of the Baltic Sea has had an adverse effect on populations of cod, which has a higher commercial value than fish species favoured by eutrophication. The drainage of wetlands is one of the many factors that explains the substantial leakage of nutrients from agriculture to the Baltic Sea. Besides that, drainage has brought about large scale conversion of wetlands to further agricultural land, which has not only further reduced nature's own nutrient retention and reduction capacity but, in addition, the nutrient load has increased through a greater volume of fertiliser input onto a smaller area of wetland.

Some exported life support services to other ecosystems may occur at a large distance from the wetland under study. For example, loss of migratory bird species can impact adversely on the control of harmful insect species many thousands of miles away.

The study found that the value per hectare (ha) increased rapidly at reduction levels exceeding 40 percent. At these reduction levels, high cost measures, directed towards airborne emissions, must be used to compensate for the nitrogen reduction carried out by Estonian wetlands. When the reduction requirement is 50 percent, as in the ministerial agreement under the Helsinki Convention, the value of coastal wetlands correspond to EEK 8,000/ha/year and of flood plains to EEK 3,600/ha/year

(at 1994 prices). The estimated total values were arrived at by summing the totals for the separate service values, which is probably not entirely valid, but, given the lack of models which deal with interaction between the single service sectors was the approach taken necessarily. The total average value of the coastal wetlands amounts to EEK 4.7 million. The corresponding value for floodplains is about five times greater at EEK 20.6 million. There is, however, a considerable range and the figures are given in Table 3.

Thus, the estimated value of Estonian wetlands is considerable. These wetlands are a critical part of the hydrological cycle and, not only is it essential to consider *in situ* effects through cost benefit analysis of changes to those wetlands and the services they provide specifically, but, also at what cost will those services have to be replaced, and that includes effects on the provision of water?

More recent work carried out in Slovakia on the Morava floodplain (Rybanic, Seffer and Cierna 1999). looks at a comparison between sustainable use (mostly through traditional practices) and alternative uses, for example, using it for growing arable crops or for gravel mining. Unlike the studies in Estonia, which looked at the denitrification properties of floodplains and coastal areas, the Morava study looked at the denitrification achieved only by plant growth.

The traditional form of agricultural management in the Morava floodplain is the production of hay. Farmers usually mow the meadows once or twice per year, depending on flood conditions. Direct market prices were used in calculating the benefits of hay production and yields obtained from farmers and agricultural firms. The substitute market approach was used to obtain the value of nitrogen reduction in the lower part of the Morava floodplain. The value of this nitrogen sink (equal to around 434 tons of nitrogen removed annually) on an area of 1727 hectares can be expressed in monetary terms as the operational clean-up cost for the same amount of nitrogen in a conventional waste-water treatment plant with the biological elimination of nitrogen. The capacity of wastewater treatment plants (WWTP) is measured in equivalent citizens (EC). Every EC produces about 11 grams of nitrogen per day. The efficiency of the cleaning powers of a WWTP with the biological elimination of nitrogen is taken to be 50 percent. If this is extrapolated to the meadow complex, this area would incorporate 50 percent of 864 tons of nitrogen per year into its biomass.

The amount of 434 tons of nitrogen which is removed annually represents a yearly production of around 216,000 ECs. Therefore the monetary value of the nutrient sink in the study area is equal to the operational cost of WWTP of this capacity. Operational costs for this sort of WWTP (labour, energy, chemicals for cleaning process, sludge deposits, sludge transportation) were estimated at EUR 1,900 per day, or EUR 690,000 per year.

This shows that the estimated monetary value of the nitrogen sink to be around EUR 690,000 per year. It should also be noted that the cost of building such WWTP would be approximately EUR 6,900,000.

A cost benefit analysis was carried out using two scenarios, an optimistic one based on two good cuts of hay (4 tons/ha from first mowing and two tons for the second), and a pessimistic one based on two poorer cuts of hay (three tons for the first mowing and one ton for the second cut). Net benefits were quite similar.

TABLE 3

Estimated annual economic values of coastal wetlands and flood plains

	COASTAL WETLANDS			FLOOD PLAINS		
Services	*Value/ha EEK*	*Area, ha*	*Total value (mill. EEK)*	*Value/ha EEK*	*Area, ha*	*Total value (mill. EEK)*
Hay, grasslands	469-871	792	0.37-0.69	450-2520	2562	1.15-6.46
Reed	835-5435	570	0.48-3.10	-	-	-
Fish	-	-	-	8716	1480	12.9
N-sink	76-8000	2945	0.02-23.56	34-3600	7867	0.27-28.32
Total	**295-9303**	**2945**	**0.87-27.4**	**1817-6061**	**7867**	**14.3-47.68**

The total social economic benefit from the conservation and sustainable use of the Morava floodplain amounts to between EUR 400 and 460 per hectare, depending on the scenario used. These figures were also significantly higher than those for corn cultivation in either a 'good' (exceptionally dry) year or 'average' (moderately wet) year.

Thus, from these studies, it is clear that wetlands play a valuable role in water management and are a valuable economic asset. From these somewhat pioneering studies, it also becomes clear that under normal circumstances, such goods and services are not taken into account when draining wetlands or converting to arable agriculture.

Furthermore, these studies show that alternative strategies can be considered when seeking to reduce pollution loads within the context of river basin planning. This has begun to be recognised by funding agencies: for instance, the GEF/UNDP Pollution Reduction Program for the Danube river basin includes several projects aiming at wetland restoration in order to play similar roles, environmentally and economically advantageous, to those described for Estonian and Slovak wetlands.

2. 'Financial'

2.1 Significant proportions of water charges must be earmarked for environmental improvements

Monies generated by the implementation of full cost recovery for water services should be gained and used in a way that reflects the environmental objectives underlying the purpose of the scheme. For example, domestic water users in a given area where groundwater reserves have been overexploited, may be currently charged at a higher rate because of the distribution costs involved in bringing water from elsewhere. In this case, the implementation of full cost recovery, in order to address the damage to the resource, should ensure that those responsible for the overexploitation would pay these extra costs. In addition, some of this money should be directed towards measures which further the relevant environmental objectives of the directive in that specific region i.e. recharging of aquifers.

Only in this way will water pricing provide an incentive to users and suppliers to reduce over-abstraction and pollution (and therefore costs) and enhance the environment in which they live or operate.

Furthermore, water pricing should be seen as an incentive not only for fulfilling the environmental objectives of the directive but also for fulfilling all the water and environment-related directives listed as the first step towards compliance (eleven in total). This is, in fact, the first obligation of the directive. This is where the directive's very influential provisions on river basin management play a significant role. For the first time, water charges may be used for securing sustainable land-use practices, restoration of degraded areas, creation of artificial wetlands for nutrient removal, and so on, thus providing the foundation for fully integrated management.

But of course this requires that the budgetary necessities are made available, and hence the need for 'earmarking' funds for environmental improvements.

2.2 Social considerations must be provided for

The social aspects of the directive must not be underestimated. Users have become accustomed to subsidised charges for water, particularly in the agricultural sector. There is often a strong cultural or societal belief that water is 'sent from God' and that everyone has a right to use it, perhaps also for free.

Strong political lobbies oppose the introduction of water pricing. Furthermore, economic difficulties in many countries and regions make the imposition of full costs recovery on many groups in society problematic, to say the least. The directive does not rule out the introduction of social security provisions to protect those on low incomes, nor does it deny governments the opportunity to 'phase in' pricing regimes.

Vulnerable social groups must be protected from excessive and unaffordable water charges. One way of ensuring this is achieved is to avoid cross-subsidising sectoral uses and charging the domestic users, who are predominantly urban. It is unacceptable that domestic users should subsidise others e.g. agriculture.

Other useful strategies include the provision to users of a 'block' or quota of water supplied at very low cost or for free, above and beyond which charges are required. In Flemish parts of Belgium, for instance, a daily allowance of 120 litres per person is guaranteed.

Many pricing strategies are being investigated so that equitable systems can be introduced. One such strategy is the 'rising block' system of charging, which encourages demand-side savings of water for the supply company and savings of money spent to the domestic user. As consumption increases, so does the per unit cost of water supplied. Thus a modest user pays less per unit of supply than does a more intensive user. This is, of course, directly opposite to the usual marketing principle of 'buying in bulk' to secure savings in price. Significantly, many countries have employed the latter, harmful and contradictory 'decreasing block' systems, for many years, including Spain (Fernandez-Lop and Asuncion 1999).

What is clear is that social opposition to the imposition of increased water charges is likely to be less significant if the public as a whole understands why they are being asked to pay more for their water. Hence there is a greater need for public participation and education than water companies and governments have recognised in the past. These are themes which the paper will return to a little later.

3. 'Management'

3.1 Different scales require different decision-making structures

Water pricing, as an element of integrated river basin management, clearly must take into account questions of scale and geography. Costs must be borne by those using (or polluting) and not by others e.g. those downstream, a factor which becomes more complicated when attributing costs for cross-border impacts.

The definition of the basic unit, the river basin district, would be the most appropriate level at which to organise water pricing systems. Yet in CEE, where river basins are often highly international in nature, this is particularly problematic.

This requires strong international cooperation and coordination, in particular, concerning the sharing of information. In the catchment area of the river Danube and its many tributaries, which is the most international river basin in the world, the secretariat of the Danube Convention, the ICPDR, would be an appropriate body to undertake this.

3.2 Implementation requires a fundamental switch from supply- to demand-side management

Water has to be treated as a finite resource, and decision-makers, including politicians in favour or opposed to water pricing, need to be persuaded to consider it as such. In all areas of policy, the move towards sustainable paths requires a recognition and adaption to the concept of 'full world economics', realising that our planet is full and resources are scarce. This is in contract to 'empty world economics', where the reverse was (relatively) true and in which context most economic theory, particularly of the liberal or free-market variety, was developed, tested, and accepted as dogma.

It is apparent that it is cheaper, easier and more equitable to improve the efficiency of current uses as a means to achieve sustainability of water resources than to try to continually increase supplies (assuming they are even available) to meet inefficient demands. Investments in the upgrading of distribution networks and more efficient technologies are two examples of this. Furthermore, not only will such approaches save water, they might also reduce budgetary pressures in regions where capital for large new infrastructure projects is scarce and where environmental conditions are particularly sensitive. Of course, water pricing is recognised as one method of inducing demand management, but there is much more to demand management than simple economic instruments.

Demand management requires a fundamental change in societal and individual behaviour, and in WWF's opinion such changes cannot be brought about, avoiding social problems, by economic instruments alone. Thus, it again becomes clear that there is a great need for information, education, and participation.

4. 'Process'

4.1 Investments are required in education and public awareness

Following on naturally from the above, investments are needed, not only in wastewater treatment plants and in economic analyses, but also in designing and implementing strategies which will increase the acceptability of water pricing to

the general public. Such strategies have to concentrate on demonstrating to domestic users why they are being asked to pay more for their water than they have become accustomed to.

Lack of awareness of the real cost of water means that users are uncommitted to improving use efficiencies. Proposals for price increases will be similarly met with hostility and reluctance to pay.

WWF and its partners have undertaken some pilot projects which have demonstrated the impact of public awareness raising activities upon water efficiency, and therefore demand. Generally these feature training programs and seminars; leaflets and educational campaigns in schools; exhibitions on water; press and media work through newspapers, radio and local television stations; cross-sectoral outreach to industry and commerce; and novel activities like prizes and awards for water saving.

In Spain for example, a LIFE-funded project in the municipality of Alcobendas, north of Madrid, has introduced a series of demand-management initiatives, which are projected to reduce overall consumption by 15-20 percent. Investments in water-saving devices are expected to be recovered within just one year. After that time, net savings on water expenditure will begin (Fernandez-Lop and Asuncion 1999).

Normally reductions can be expected in the order of five to eight percent. The first NGO-driven initiative in Spain took place in Zaragoza, in 1996, with the target of saving 1,000 million litres of domestic water. By February 1999, the project had exceeded this target and had achieved a reduction of 1,176 million litres, or six percent of total annual consumption (Fernandez-Lop and Asuncion 1999).

All these activities cost money, and whilst the NGO community is often very keen and willing to design and implement such programs, NGOs are just like all other types of organisation, in that they need to cover their costs and, therefore, need to be funded. Examples like these from Spain, however, show that investments in the human capital can also pay back a healthy dividend, through saving water.

4.2 Participation is a must, and it is needed immediately

Closely connected to the need for public awareness, is the need for public participation, which is almost the same thing. Of course public participation is enshrined within the Directive, meaning that, often for the very first time, water authorities and companies will be required to consult with the public before, for example, determining management plans for river basin districts. This is, of course, only right and proper.

However, for water pricing, the need for participation is also acute. As mentioned above, resistance and perhaps hostility to increases in water charges can be anticipated in many parts of Europe. As demonstrated for Spain, the provision of information and raising of awareness can help to change habits concerning water consumption.

The public, especially through the organisations often loosely termed 'civil society', needs to be consulted from the beginning concerning water pricing. Only in this way can those civil society organisations be expected to play the valuable leadership role of 'smoothing in' the transition to higher water charges.

The European Commission recognises this, and is attempting an open strategy towards water pricing, as evidenced by the Sintra conference, joint Seminar Series on Water with WWF, and this conference in Szentendre.

Still other opportunities exist. Most parties have welcomed the Commission's decision to draft and distribute guidelines on the development of water pricing strategies. But at the recent Lille Conference on water pricing (September 2000), it was suggested that a small, exclusive network of water company officials would develop these guidelines in association with the Commission, without significant public participation.

Where civil society has a contribution to make to the water pricing debate, including the development of what will become influential Commission guidelines, it must be allowed to do so. The development of these guidelines should be conducted in an open and transparent way, and NGOs with an interest and expertise in this subject must be invited to put forward their views.

Where civil society does not have a contribution to make, it should be targeted with education and awareness programmes, as described above.

5. 'Integration'

5.1 Conflicting policies must be harmonised and all sectors properly integrated

In addition to the principles discussed earlier, there are some other very basic principles that need to be addressed: user pays; polluter pays. These two are, of course, inextricably linked. In many cases, not only is the user paying for the privilege of obtaining drinking water but also for cleaning it to the level to make it safely drinkable. The latter requirement may well be due to contaminants arising from agricultural practices where, clearly, the polluter is not paying. Furthermore, the agricultural practices may well be subsidised, a further call on the user's expenditure, and the supply of water to the farmer may well not only be free but also subsidised in the form of water transfers, such an example would be tobacco or cotton in Greece.

There are many examples of such conflicting policies. In Spain, unsustainable water demand has traditionally been driven by such conflicts, with the environment playing the role of hidden subsidiser. The EC Common Agriculture Policy (CAP), which has subsidised and favoured irrigated production rather than more traditional (and sustainable) forms of land use such as extensive olive production, combined with the use of EC Structural Funds for dam and hydropower development, has driven the agricultural demand for (scarce) water resources upwards.

Not only are such forms of agriculture environmentally harmful, but the historical lack of proper cost recovery has meant that there are incentives to use more water rather than less. The investment costs of the Biscaurres dam in Aragon, for example, have been estimated at ESP 3.6 million/ha of irrigated land, whereas farmers are asked to pay only ESP 5,000/ha per year. Cost recovery for such infrastructural developments in water supply range from only 0.4 percent to 1.0 percent (all data from Fernandez-Lop and Gutierrez-Monzonis 1999).

In Austria, seen by most in Europe as relatively water-rich, standard agricultural practices have led to nitrate and pesticide concentrations in groundwater in excess of national and EC legislation. Almost three-quarters, 73 percent, of

Austria's groundwater regions have therefore been designated as in 'need of restoration', and water cannot be directly used for human consumption from these aquifers. Water suppliers, bound to provide clean and healthy water to users, have had to make significant investments in order to counteract this problem and avoid prosecution. The additional costs of dilution and treatment for polluted groundwater have either been borne by the companies themselves or passed on to domestic users. Clearly, the polluter is not paying (Lughofer 1999).

In Central and Eastern Europe, there is a significant danger that some of the mistakes from the present day Union will be repeated. WWF has already recently highlighted 'pre-accession' projects in Poland (Oder and Vistula dam projects) and Bulgaria (Trans-European Network motorway through Kresna Gorge) which threaten to impose similarly unsustainable and conflicting schemes upon the environment and national citizens of those countries. These cases, which have attracted much opposition within the countries concerned, have been brought to the attention of the European Parliament and Commission.

Such conflicts in policy, and especially the unsustainable use of public funds, whether EU or domestic, need to be eliminated and avoided if water pricing policies are to be fair.

6. Conclusions

The development of appropriate water pricing systems, aimed at promoting sustainability of water management and the full cost recovery for water supply (including environmental damages), offers much potential for achieving the environmental objectives of the Water Framework Directive. However, as shown above, a number of other considerations have to be taken into account, and it must be emphasised that water pricing alone is not enough. There needs to be a blend of other appropriate policies and actions, including the promotion of public participation and education.

WWF believes that the ten actions outlined above would go a significant part of the way towards introducing policies, including water pricing policies, capable of safeguarding European freshwater resources, north, south, east and west. As a conservation organisation, WWF, together with its governmental and NGO partners throughout Europe, will continue to promote the sustainable use of water resources, and continue to support the development of policy tools and approaches necessary for sustainability, in an open and participatory manner.

REFERENCES

Andreasson-Gren, M., and Groth, K.-H., (1995), *Economic Evaluation of Danube Floodplains*, WWF International Discussion Paper, Gland, Switzerland.

Andreasson-Gren, M., Erhlich, U., and Pedersen, M.-B., (1999), *Economic Valuation of Floodplains and Coastal Wetlands in Estonia*, WWF International (in press).

Avis, C., and Weller, P., (2000), 'The Water Framework Directive and the Danube River Basin: Opportunities for Enhanced Ecological Management and Public Participation' in *European Water Management Journal* Volume 3, No. 2, pp. 46-50.

Barbier, E., Acreman, M., Knowler, D., (1997), *Economic Valuation of Wetlands: A guide for policy makers and planners*, Ramsar Convention Bureau, Gland, Switzerland.

Daily, G.C., (1997), 'Introduction: What are Ecosystem Services?' in *Nature's Services: Societal Dependence on Natural Ecosystems*.

European Commission (2000), *Communication from the Commission to the Council, The European Parliament, and the Economic and Social Committee: Pricing Policies for Enhancing the Sustainability of Water Resources*, COM(2000) 477 final, Brussels 26.07.2000.

Fernandez-Lop, A., and Gutierrez-Monzonis, B., (1999), *Pricing as a Tool to Reduce the Impact of Agriculture on Water Status*, WWF poster presented at the Sintra Conference on Pricing Water: Economics, Environment and Society, Sintra, Portugal, 6-7th September 1999.

Fernandez-Lop A., and Asuncion M., (1999), *Pricing as a Tool to Reduce Water Demand*, WWF poster presented at the Sintra Conference on Pricing Water: Economics, Environment and Society, Sintra, Portugal, 6-7th September 1999.

Gleick, P.H., (1996). 'Global Water Resources in the 21st Century; where should we go and how should we get there?' Plenary address to the 1995 Stockholm Water Symposium, in the *Proceedings of the Stockholm Water Symposium, Water Quality Management: Heading for a New Epoch* 5:73-78.

Hufschmidt, M. M., et al, (1983), *Environment, Natural Systems and Development: an Economic Valuation Guide*, John Hopkins University Press, Baltimore: M.D.

ICWE, (1992), The Dublin Statement on Water and Sustainable Development. International Conference on Water and the Environment, Dublin, Ireland.

Lughofer, S., (1999), *The Impact of Agriculture on Water Quality: Costs of Groundwater Pollution in Austria*, WWF poster at the Sintra Conference on Pricing Water: Economics, Environment and Society, Sintra, Portugal, 6-7th September 1999.

Maestu, J., (2000), *Some Empirical Evidence of Price Changes and Efficiency Improvements in Water Use in Agriculture in Spain*, Paper presented at the Lille Conference on Water Pricing, Lille, France, 13-14th September, 2000.

Myers, F.M., and White, G.F., (1993), 'The challenge of the Mississippi flood'. *Environment 35*, No. 10.

Rybanic R., Seffer J., and Cierna M., (1999), 'Economic Valuation of Benefits from Conservation and Restoration of Floodplain Meadows' in *Morava River Floodplain Meadows: Importance, Restoration and Management*, Ed. J. Seffer and V. Stanova, Bratislava, Slovakia.

Turner, R.K., (1998), *The Environmental Effects of Market and Intervention Failures in the Management of Wetlands*, Report to the Environment Committee Group of Economic Experts, OECD, Paris, November.

Tydeman, C., (1998) *Putting a Value on Ecosystems*. Paper presented at the Sintra Conference on Pricing Water: Economics, Environment and Society, Sintra, Portugal, September 6-7 1999.

United Nations Conference on Environment and Development (UNCED) 1992. United Nations Publications.

Urban water pricing reform in the NIS: obstacles and opportunities[1]

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Abstract

The poor performance of many water utilities (vodokanals) in towns and cities across the Newly Independent States for the Former Soviet Union (NIS) is incurring high social costs, especially for the most vulnerable. Further, the financial situation of many of these vodokanals is unsustainable. Fundamental, and long term, price, regulatory and financial reforms are required to improve their delivery of sustainable water services. However, long term changes in water prices, tariffs and financial management structures are difficult to achieve politically and institutionally, especially within the lifetime of most donor-driven water service commercialisation projects. Also, it is not conceivable that every city in the NIS will be able to collaborate in an externally funded water pricing reform project. It is therefore useful to identify some short term, achievable, price reform measures that can be taken without external assistance and that can help to trigger the longer term commercialisation process required to improve urban water services in the NIS.

This paper presents a summary of some recommendations for such short term water pricing reform measures for cities in the NIS.

1. INTRODUCTION

From 1999-2000, a project entitled Opportunities and Obstacles to Commercialising Urban Water Services in the NIS was undertaken by the International Development team at Environmental Resources Management (ERM) Ltd. The project was funded by the UK Department for International Development (DFID), in close co-operation with the OECD EAP Task Force. The objectives of the project were to:

- Present an overview of the current status and common problems and features of urban water and wastewater management in the NIS which would affect commercialisation; and
- Identify some of the most significant policy, institutional and financial obstacles and opportunities for commercialisation, including the types of reform which were likely to be most effective.

1. This paper is a synthesis of some findings from a UK DFID supported project entitled 'Obstacles and Opportunities to Commercialising Urban Water Services in the newly Independent States (NIS)', that was carried out recently by ERM in co-operation with the OECD EAP Task Force. In September 2000, the main results of the project were presented and discussed at a conference on Economic Instruments and Water Policies in Central and Eastern Europe: Issues and Options, hosted by the Regional Environmental Centre at Szentendre, Hungary and supported by the European Commission DG for the Environment. This paper is based on that presentation.

The project was designed to achieve these objectives through a combination of research, analysis and a large amount of local consultation, including case study visits and a major stakeholder workshop.

2. CURRENT SITUATION AND THE NEED TO REFORM

2.1 Availability and distribution of water

The percentage of households across the NIS with access to safe water and sanitation is relatively low compared with worldwide norms (Table 1). Access to safe water is, on average, some 15 percent lower than most other countries in a similar income bracket, and access to adequate sanitation is almost 30 percent lower (World Bank 1999).

2.2 Health related problems

The deterioration of water supply and wastewater treatment facilities across the NIS has meant that many health problems are now more akin to those of developing countries. Such problems include a prevalence of diarrhoeal diseases and gastrointestinal illnesses associated with unsafe water, particularly in the more Eastern NIS. Several studies, have shown that micro-biological contaminants are present (or are believed to be present) in drinking water in the NIS.[2]

2.3 Physical condition of assets

Water supply losses of 50 percent or more are common throughout NIS cities,[3] and there can also be considerable variation in supply between different users. Inadequate water supply within cities is often attributable to poor maintenance of pumps (or lack of funds to pay for the electricity to run them), particularly in highrise buildings, where residents above the second or third floor often do not receive any supply (Montgomery Watson 1998).

The region's municipal wastewater treatment facilities are typified by either a lack of treatment altogether, or a limitation to primary treatment alone. Even where systems provide secondary treatment, poor maintenance, high electricity costs and limited financing often reduce system efficiency.[4]

2.4 Who carries the cost of poor water services?

Many socio-economic studies have been carried out in the NIS, particularly as an adjunct to the various vodokanal (water utility) reform projects, supported by international donors. These studies have generally confirmed that the groups most affected by poor water supplies tend to be women (who usually bear responsibility for securing alternative supplies), the elderly, those living on higher floors of apart-

2. For example, the Baku Water and Sewerage Masterplan Study identified that bacteriological quality levels in water in the city are consistently well in excess of WHO standards (Montgomery Watson 1998), and a household survey in the Aralsk and Kazalinsk Rayons of Kazakstan, indicated that over 75% of households boiled their water before drinking (World Bank 1996).

3. For example, in Tbilisi, Georgia, it was estimated that up to 700 km of pipeline were seriously deteriorated, and as little as one quarter of supply actually reached the consumer (GIBB 1999). In Zaporizhzhia, Ukraine, 25% losses were recorded, but metering was not widespread and real losses were estimated to be closer to 50% (London Economics 2000). In Dushanbe, Tadjikistan, losses were estimated to be as high as 70% (World Bank 1999). In the Aral-Sarybulak system in Kazakhstan (which serves 60,000 people), it was estimated that as much as 50% of the system needed to be urgently replaced due to excessive supply losses (Danilenko 1998).

4. The problems with the wastewater infrastructure were well illustrated by the three main towns of the Aral Rayon in Kazakhstan, where wastewater treatment facilities had been all but abandoned due to lack of funds for maintenance (Danilenko 1998), and Tbilisi, Georgia, where it was estimated that less than half of wastewater generated by the city reached the main Gardani Treatment Plant, and where it was judged that effluent leaving this plant was at least as polluting as the sewage inflow (GIBB 1999).

TABLE 1

Access to safe water and sanitation in the NIS

		SAFE WATER	SANITATION	
Country	*Population in millions (1998)*	*Percentage of total population with access (1998)*	*Percentage of total population with access (1995)*	*Percentage of urban population with access (1995)*
Armenia	3.8	85	-	-
Azerbaijan	7.9	-	36	-
Belarus	10.2	-	-	-
Georgia	5.4	-	-	-
Kazakhstan	15.7	-	-	-
Kyrgyz Republic	4.7	75	-	87
Moldova	4.3	56	50	96
Russian Federation	146.9	-	-	-
Tajikistan	6.1	69	62	83
Turkmenistan	-	60	60	70
Ukraine	50.3	55	49	70
Uzbekistan	24.1	57	18	46
High income	-	97	92	-

Sources: World Development Reports 1998-99, 1999-2000; World Development Indicators 1999

ment blocks and the residents of peripheral communities. As would be expected, all of these groups have developed coping strategies, whether it is boiling water, storing it during limited periods of supply (for example in baths), or procuring supplies from private vendors. However, it is also clear that some households effectively spend many times the cost of their monthly water bill on alternatives.[5]

3. OBSTACLES TO REFORM

The key obstacles associated with water pricing reform in the NIS seem to be related to: water pricing policy, tariff setting, collection of payments, tax obligations and inflation, municipal financing and subsidies. Each of these are looked at below.

3.1 Water pricing policy

Water is still viewed and treated as a public rather than an economic good in most NIS countries. Consequently, vodokanals remain wholly state-owned and are often managed according to social (and political), rather than financial or economic, objectives. Reform is often sluggish therefore, as political constraints to price changes commonly take precedence over cost recovery or efficiency objectives.[6] As a result, prices for water are often set unrealistically low.

5. For example, households in Baku were found to spend up to 17 times the cost of their monthly water bills on alternative water supplies (World Bank 1995). In addition, it is also the case that the poor spend a significantly higher percentage of their income on strategies to cope with inadequate public water supplies than wealthier families.

6. In many provinces in Russia, for example, the water tariffs for households, are usually set directly by municipal authorities rather than the vodokanals. As a result, (waste) water prices are often considered not as an important financial tool for vodokanal development, but as a political instrument for maintaining popularity among local residents.

3.2 Approaches to tariff setting

Most approaches to tariff setting for water in the NIS do not allow the operator to fully charge for the service it supplies, and as a result costs become difficult to cover.

An average cost pricing approach is generally used to calculate water and wastewater tariffs in the NIS. The total anticipated cost of supplying water for the forthcoming year is divided by the projected output of water to be supplied. This means that it is difficult for the company to charge either an economically efficient or a financially viable price per cubic meter of water.[7] A cost-plus methodology is often used to regulate water prices[8], with the allowed profit margin being set at anywhere between 10 and 40 percent or more (and then often taxed). This means that there is no incentive for the operator to improve efficiency, as revenues would be reduced if costs decrease.

The state (at municipality or national level) usually decides what fixed or variable costs can be included in the (waste) water tariff calculation. In order to keep costs low (so the customer faces a lower price for water), this often means that the recovery of costs incurred is constrained. For example, bad debt is often not included in the calculation of charges, depreciation charges are often set at a very low rate, and inflation is rarely factored into the equation.

Further, individual meters in apartment blocks rarely exist, and are difficult to install. The average cost per cubic meter supplied is usually, therefore, subject to multiplication by a series of (often unrepresentative) norms — for example, estimated consumption per person per day, or number of people per household etc — to produce a water and wastewater bill.[9] Effectively this means that customers face a monthly tax for water services, and have no incentive to use water economically. In most cases, industrial and state enterprise customers are supposed to have water meters and be charged on a volumetric basis. In reality, however, it is common for their meters to be broken or not in place and for state enterprises especially not to pay their bills.[10]

Finally, the operator is then often obliged to discount these low (waste) water tariffs still further for various consumer groups on the basis of a wide series of social objectives. The result can often be that a large proportion of domestic consumers can obtain up to a 30 percent or more reduction in their bill. However, the state rarely fully compensates the water operator in cash for these social reductions. Also, water charges for domestic consumers are often cross subsidised by higher tariffs for industry. These differences can range up to a factor of ten or more, often creating conditions which can stifle the competitiveness of industries, or where

7. In the sense that often the allowable operational costs do not reflect all long run costs of supply.

8. This means that tariffs are calculated on the basis of an agreed set of costs, plus an allowance for profits. The profit allowance is set as a percentage of costs. This methodology is usually used when an operator is state-owned and the tariff and profit level is determined by the government, however, it can also apply to private operators.

9. In Tbilisi, Georgia, for example, the norm assumed that people use 800 litres (l) of water per capita per day, and the domestic charge per cubic meter of supply was then multiplied accordingly. However, user studies suggested that the true figure was closer to 250 litres per person/day. In Baku, Azerbaijan, the vodokanal assumed a monthly per capita water consumption of about 400 litres per person/day. This figure was used as proxy for the calculation of water tariffs, however, user surveys found that actual water use was comparatively low (80 to 120 l/day).

10. In Baku, Azerbaijan, the purchase and installation of water meters has been obligatory for all enterprises with specified consumption limits since the start of 1989 (around 80 percent of all Baku enterprises). However, by the end of 1989, only 56 percent of the enterprises surveyed had meters which were working. A further survey in 1995, indicated that the situation had hardly improved (World Bank 1995).

industries simply do not pay their bills. While policies to reduce cross subsidisation do exist in some of the NIS, actual changes in the tariff have been rare.

3.3 Collection of payments

The water and wastewater bills for urban domestic consumers are often collected as part of a wider service charge bill by a separate collection agency. These agencies often have an incentive to retain a proportion of the collected water and wastewater fees, over and above their allotted amount.

There has been a historically low collection rate for water and wastewater charges, especially from state enterprises who are predominantly the worse debtors. They face no incentive to pay their water bill in cash, and often eventually settle through barter and offset arrangements. This means that in many cases the average cost of supplying water and wastewater services is actually often higher than the revenue received.[11]

3.4 Tax and inflation

Operators often have to include a large range of obligatory payments or taxes to the state at city, oblast or national level, within the water tariff. Although many of the operator's tax payments are permissible as operating costs, most tax payments are calculated on the potential, rather than the actual revenues received. Taxes are also often levied on the allowed profit margin as well, in the form of a 'profit tax', which can range from 20 percent to 40 percent of the allowed profit margin. Generally, all of these taxes must be paid in cash and are often required in advance of revenue being received from customers. Heavy tax burdens are a key issue, especially when payments to the vodokanal are made significantly in arrears, in non cash form, or when bad debts are substantial. The implication is that revenue shown in the cash flow statement tends to be significantly lower than income shown in the profit and loss statement. Corporation tax and VAT can then impose serious burdens on cash availability for the vodokanal. The situation often arises whereby a vodokanal is operating at a significant loss, but is still obliged to pay a significant tax on its 'profit', thus creating serious consequences for its ability to re-invest.

High levels of inflation over the past ten years or so have proved problematic, worsening the cash situation for water and wastewater operators, as tariff adjustments have been typically sluggish and *ex post*. The prices of key inputs such as fuel and electricity can be particularly affected. Likewise, there is no standard method for adjusting charges for inflation, and (often quarterly) wholesale changes to the tariff to 'catch up' with price changes to key inputs can take a long time to calculate, process and approve.[12]

11. In Chisinau, Moldova, for example, a survey found that of the 15 main water industrial consumers in the city, it appeared that only four paid their water bills. The remainder, mostly state enterprises, had accumulated large debts. In Russia, payments made by budget organisations and industry were usually in the form of barter, offsets and promissory notes. Non-cash payments from budget organisations could reach 90 percent of the amount due. At present, the majority of Russian vodokanals collect less than 40 percent of their billings, some less than 20 percent. Furthermore, bad debt provisions are only allowed once the debt is three years old, or where the debtor is liquidated.

12. In the Ukraine, for example, the vodokanals' projected production cost figure which is used to calculate tariffs for all customer categories are based on figures indexed to anticipate inflation, energy cost increases, etc, during the period for which the tariffs are being calculated, except for the domestic sector. When a particular vodokanal in the Ukraine submitted similarly indexed figures for calculating tariffs for the domestic sector, the State Price (continued overleaf)

3.5 Municipal financing for water and wastewater investments

Most urban water and wastewater supply networks in the NIS require urgent capital investment. Most assets are almost fully depreciated, and inadequate asset calculations, severely constrained depreciation charges, maintenance funds and profit margins mean that the revenue-based finances required to sustain, let alone improve, the current networks, are simply not available.[13] [14] The key sources for new investment for the vodokanals are either the state budget (city, oblast or national) or the allowable profit margin within the tariff. State resources are in almost all cases severely constrained and investment from this source thus remains erratic and based on crisis rather than long term management. Within the tariff, the profit margins that are allowed, particularly when coupled with high taxes and poor rates of revenue collection, are often too small to finance anything other than minor investments or repairs. It is also difficult, and often illegal, for the operator to use these profit margins to debt finance investments in the water supply network.[15]

As a result of these investment problems, none of the vodokanals looked at in this study were operating on a sustainable basis, prior to an externally financed reform process taking place.

4. OPPORTUNITIES AND PATHWAYS FOR REFORM

4.1 Long term financial reform

The research showed that, in the long-term, water pricing reforms should aim for full cost recovery; commercially oriented urban water service providers should be able to make their own management and operational decisions; their prices and performance should be regulated by independent bodies; there should be room for others to compete for parts of the market; and there should be a well-targeted state subsidy system. These long term recommendations are non-controversial, and are generally supported by many agencies and studies (e.g. World Bank 1996, Pezzey and Mill 1998, EBRD 1999, OECD 1999, London Economics 2000).

(12, continued from previous page) Control Inspectorate (SPCI) determined that the vodokanal had violated the Law on Prices and Pricing (the inflation-indexed figures were characterised as unauthorised production costs). The position of the SPCI was that tariffs for the domestic sector should be based on projected production costs for the most recent months for which figures are available, rather than on estimates for the current year, but with no indexing for inflation. It is difficult, therefore, for vodokanals in the Ukraine to ensure that adequate revenue flows will accrue to them from the domestic sector over time, even if collection rates are 100 percent.

13. In Russia, for example, the maintenance fund is supposed to cover the operational and maintenance costs of providing water services to the customer. However, the maintenance funds of the Russian vodokanals have often been run down over time. This is because they have traditionally been used by the water companies as the cushion to soften the blow of municipality decisions to lower the overall water tariff. Hence, most vodokanals have depleted or inadequate maintenance funds and a limited ability to ensure their gradual development again over time.

14. In Chisinau, Moldova, the vodokanal's fixed assets were heavily undervalued in order to help keep the tariff low for consumers. Although depreciation rates were in line with industry norms (15-20 years for plant and machinery, 40-50 years for pipes and reservoirs) the depreciation charges allowed in the tariff were wholly inadequate. For example, in 1996, depreciation for the Chisnau Vodokanal was submitted in the tariff at less than MDL 1 million per year. A restatement by consultants for EBRD suggested a figure of MDL 60 million per year was more appropriate. They also recommended a re-valuation of the Chisinau utility's assets at MDL 4.0 billion based on replacement costs. The Chisinau local authority consequently re-valued the utility's assets in 1996 and came up with a lower gross asset value of MDL 1.5 billion. This was still a seven to eight fold increase on the previous valuation. The final EBRD loan required a depreciation charge of MDL 38 million per year to be set as a minimum.

15. In Russia, for example, the assigned profit level of 25% for vodokanals, is the source from which enterprises are expected to finance their 'small' investment programs from. Fixing the profitability level at 25% is seen to secure a 'simple reproduction' of the physical assets of the vodokanal, but only in a situation of low inflation, and where an equal proportion of labour can be used to match the level of capital required. Even taking the constraints of this approach into account, the payment of interest charges on any long-term loans is also expected to come out of the assigned profit component (net of tax payments due on it). Debt financing from this profit margin is thus discouraged. In reality, therefore, the major share of the assigned profit is spent on urgent repairs and not on investment or expansion.

However, the challenge for implementing such sustainable pricing reforms is to recognise that the problems are not only financial ones, but that there are also complex economic, institutional, legal and political issues to consider as well. The political and legal ramifications of implementing a wholesale change to the water pricing, tariff and regulatory system in every NIS city are huge, and would take many years of commitment to achieve. In the short term, meanwhile, many city populations are facing high social costs from poor urban water services. What practically, therefore, should a pricing reform process recommend?

4.2 Short term financial reforms

To help facilitate the long term transition process, the study found that there are a range of pragmatic, short-term actions which can be taken, which do not necessarily involve sudden, unpopular change or incurring municipal debt for financing. In summary these were identified as follows:

4.2.1 Water policy reform

- *Start developing a financial policy for water services.* Keeping the cost-plus regulatory framework, the city administration, together with the vodokanal should decide upon the level of cost recovery the vodokanal should aim for in the short term, (and hence the levels of investment the city needs to provide if full costs are not to be recovered), as well as a method of realistically calculating these costs, which moves away from the constraints of the existing norms.[16]

- *Set some performance targets.* Short term (realistic) targets for the vodokanal to work towards should be set, together with the supporting actions that will be taken by the City administration. These targets should be embedded within a clear performance agreement.[17]

- *Clarify ownership and use of assets.* The ownership of the water infrastructure assets should be clarified, and clear responsibilities for managing them identified.[18]

- *Start the commercialisation process of vodokanals.* The city administration, should help to ensure a smooth transition for the vodokanal to corporate status, by providing an enabling environment for the process.[19]

16. For example, in the short term a move toward allowing full operating and maintenance costs (including tackling the bad debt and inflation indexing issues) could be viable. This would create a responsibility for the state to provide investment funds. In the longer term, of course, a minimum target price for water that covers operation and maintenance, plus depreciation and provision for long term liabilities, should be aimed for.

17. For example, by year X certain targets of service improvement should be met by the vodokanal, provided the city accepts water tariffs based on an agreed level of realistic, inflation-indexed costs, rather than outdated norms.

18. For example, a statement could identify the vodokanal as responsible for operating and maintaining networks (and thus setting the tariff and planning expenditure on this basis), but for the City as owner of the networks, to provide funds at defined stages for key capital investments to replace parts of the asset base. If this information is transparent, then if the performance falters it should be clear where responsibility lies.

19. For example, when granting the Vodokanal corporate status, the City should create a management structure which is at 'arms length' from the political authorities, and empower the Vodokanal to make its financial and investment planning systems more account specific and transparent, update its management and human resource systems and start to produce business/corporate development plans. Support from the Vodokanals themselves is vital to make this process succed. Also, encouraging Vodokanals to take such actions may also stimulate public debate, bringing other realted issues in to the public arena, and making vodokanls raise their awareness of public relations management.

4.2.2 Tariffs

- *Move away from the norms*. The city administration should allow real costs to be charged, as part of the cost-plus formula, to recover the level of costs agreed within the agree financial policy.

- *Allow the tariff to react to inflation and bad debt*. Key cost components within the tariff calculation (eg fuels, electricity) should be indexed to inflation, rather than the tariff updated as a whole. Bad debts should be dealt with. For example, if, say, five percent of amounts due will not be received than this should be factored into the cost recovery mechanism.

- *Tax obligations*. The ability for the vodokanal to pay tax on cash revenue received rather than revenue due is a useful first step that can be taken. As the worst debtors are usually other state owned enterprises, the drop in tax revenue to the City should encourage the administration to look at improving the financial management of its other enterprises.

- *Think about moving away (or adapting) the cost plus price regulations for water*. Central and city government need to develop appropriate incentives for the vodokanals to reduce short and long term costs. Tariffs could be regulated and kept at an affordable level by developing systems with consumers to collect up to date water consumption statistics and using them to regulate tariffs and index them for inflation. Consumer groups should assess their own consumption levels against others, and exert pressure to make improvements to the norms if necessary. Ways of factoring incentives for increasing productive efficiency to the cost-plus price structure could also be developed.[20]

- *Dual accounting*. A dual accounting process could be initiated to indicate to the city what the difference is between the tariff calculated within the existing constraints and the tariff that should be charged, if certain costs were to be fully covered. In this way, the real costs to be recovered can be identified, modelled and discussed more gradually, during a tariff transition period.

4.2.3 Collection

- *Increase revenues through increased collection rates*. Vodokanals should be provided with the right to collect payments directly from customers and to be able to cut non-paying customers off. The city administration should develop a programme to ensure that the bills of budgetary organisations (hospitals, schools, etc.) are paid in cash from city funds. If such payments are not made promptly, a mechanism could be developed whereby the vodokanal withholds payments of taxes to the city reflecting the amount due in outstanding charges from other city institutions.

4.1.4 Investment

- *Make an up to date inventory of the asset base*. This would allow a definitive assessment of what exactly the investment requirements are for each sector of operations and how urgently they are required.

20. A system could be whereby any decrease in operational costs is reflected within a larger allowable profit margin. Thus costs may decrease, but the overall price charged stays the same, ensuring the vodokanal does not lose out on any revenue as a result of reducing its costs.

- *Develop short-term solutions to meet urgent investment needs*. Temporary or emergency investment funds could be created by the central or city government to help provide the vodokanals with the capacity to address urgent investment issues. This can take the form of earmarking some of the obligatory payments Vodokanals pay the state into defined maintenance, depreciation and renewal funds, or drawing on resources available from environmental funds.[21]

- *Re-invest cost savings*. The vodokanal could develop short to medium-term action plans for cost savings and negotiate with the city government to allow them to keep and/or re-invest these savings.

- *Debt financing*. Well targeted, performance related grants or soft loans could be sought to provide transition assistance during the vodokanal's early reform period. These could come via international assistance or from internal financial sources, such as municipal or city banks. The ability of the city to act as guarantor on these loans emerges as a key issue here. A concrete first step therefore, could be for the city administration to establish its creditworthiness.

4.1.5 Other reforms

- *Undertake affordability and willingness-to-pay studies*. Guidelines for the preparation of affordability and willingness to pay studies could be developed, and the city and vodokanal encouraged to include them as a standard element of any investment preparation and/or tariff re-calculation. Information gained from such studies could help revise the norms used and the levels of service provided for the different customer bases.

- *Unravel and rationalise subsidies for poor customers*. This is a critical area for short term reform. National, oblast and city governments could seek to rationalise the social subsidy system, by providing transparent budgetary information on the resources (and the means of their calculation) that will be allocated to municipal services for social services. The city can make great improvements in the efficiency of the allocation of these subsidies by re-identifying who is eligible for a subsidy, how their subsidy can be paid directly to the service provider, or the recipient, and guaranteeing when the subsidy will be paid. Consumer groups and NGOs could help assist local government and vodokanals to identify those most in need.

- *Create a mechanism for exchange of information on restructuring and reform*. By using existing government networks and by developing new networks (for example a cross departmental vodokanal reform PMU), the city or oblast can learn from the experience of others, or share their experience, on the vodokanal price reform process. This action can also help to create a single contact point and area of responsibility for those interested in the reform process, rather than reform (and responsibilities for reform) being dispersed across a range of city or oblast administrative departments.

21. Temporary financing solutions can be found through analogues from the NIS and the CEE, such as the proposed water fund in Lviv, the use of maintenance, depreciation and renewal funds as in Romania, or the creative use of environmental funds (via soft loans) to help generate urgent short-term finances or help pay the water bills of the socially vulnerable during the transition period, (as in Estonia).

- *Analyse the suitability of private sector participation in vodokanal operations*. Becoming more sensitised to the private sector participation options on offer, and what would be most appropriate for the particular city or vodokanal, would be a credible short term aim. National, oblast and city government could decide upon the longer term changes in legal and institutional frameworks, that will be necessary to facilitate the level of private sector participation identified as most useful to aim for (if any) in the short to medium term.
- *Strengthen, clarify and simplify customer complaints procedures*. National, oblast and city government could establish and encourage mechanisms for consumers to exercise their rights relating to service provision, while the vodokanal could be encouraged to develop customer complaints procedures and set short term targets to strengthen their in-house procedures.

5. CONCLUSIONS

The poor physical condition of water and wastewater infrastructure in urban areas is one of the main challenges in the environmental service sector currently facing the NIS. This problem is a large contributor to poor public and environmental health, as well as the high social costs associated with irregular and insecure water supplies. Often the burden of these social costs fall disproportionately on the poorest. In general, the financial problems for the urban water sector in the NIS stem from a history of gross under-investment, and from water tariffs that are set too low for operators to recover even basic costs.

Discussions on water finance reform in many NIS countries are often triggered by international development banks or agencies, who encourage the restructuring of vodokanals with their assistance. These projects generally focus on the use of debt finance for investment, the raising of tariffs to cover operational costs and the new debt, and the restructuring of management in order to allow more commercially-orientated decision-making.

However, few of these reform projects have been entirely successful to date. Often, the pricing and financing reforms these projects require can only be realistically achieved by following a process of long-term change. Yet many projects call for reforms within a much shorter period, particularly on issues such as raising tariffs. Raising tariffs alone does not guarantee that more revenue will be collected, that more investment or debt servicing will be made, or that the vodokanal will become a more efficient operator. Further, the political commitment to raising tariffs in the long term can vary greatly. Finally, even if these obstacles could be overcome, it is not feasible that every vodokanal in every NIS city can rely on accessing the finance and assistance of a development bank or agency, in order to reform.

Instead, it seems important to identify a number of pragmatic short-term actions which can be taken by NIS city governments and vodokanals to initiate the commercial reform process, which will both contribute to improving the water and wastewater services in the short-term, and improving the circumstances for any subsequent long-term sector reform plan. Moreover, the majority

of these actions should, as far as possible, provide a tangible political benefit for the city administration (through the improvement of water services) as well as requiring little finance or technical know-how.

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REFERENCES

Danilenko, A.V., (1998), *Republic of Kazakstan: Water Supply and Sewerage in the Aral Sea Region — Institutional and Ownership Structure. Infrastructure and Energy, Europe and Central Asia*, The World Bank: Washington, D.C.

EBRD, (1999), *Transition Report 1999*: *Ten Years of Transition*, European Bank for Reconstruction and Development, Section 9.3 pp. 170.

GIBB, (1999), *Tbilisi Water Sector Institutional Study*, *Phase I Report*, Tbilisi Water Utility Development Bureau, Georgia and GIBB, LAWGIBB Group Member.

GIBB, (1999), *Technical and Financial Projections for the Tbilisi Water Utility*, Tbilisi Water Utility Development Bureau, Georgia and GIBB, LAWGIBB Group Member.

London Economics, (2000), *Ukraine Zaporizhzhia Water Utility Development and Investment Programme*; *Tariff Reform*, Draft Final Report for DFID, February 2000.

Montgomery Watson, (1998), *Water and Wastewater Master Plan for Greater Baku* (*Draft Report*), *Volume 1*: *Executive Summary*, Montgomery Watson: UK.

Montgomery Watson, (1998), *Water and Wastewater Master Plan for Greater Baku* (*Draft Report*), *Volume 6*: *Institutional Development Plan for Greater Baku.*

OECD, (1999), *Household Water Pricing in OECD Countries*, Environmental Policy Committee, May 1999.

Pezzey, J., and Mill, G., (1998), *A Review of Tariffs for Public Water Supply*, Environment and Development Unit, University of York, Report to the Environment Agency, January 1998.

World Bank, (1995), *Azerbaijan: Baku Water Supply Rehabilitation Project — Social Assessment*, Social Assessment Series Paper No. 017, Environment Department, World Bank: Washington, D.C. pp. 75.

World Bank, (1996), *Economic Regulation of Water Companies*, M. Klein, Policy Research Working Paper 1649, World Bank: Washington, D.C.

World Bank, (1996), *Staff Appraisal Report No. 15867-KZ*: *Republic of Kazakhstan*, *Pilot Water Supply Project*, World Bank: Washington, D.C.

World Bank, (1996), *Republic of Kazakstan*: *Proposed Water, Sanitation and Health Project — Social Assessment*, EMTEN Social Team, Environment Division, ECA/MNA Technical Department, World Bank: Washington, D.C.

World Bank, (1996), *World Development Report 1996*: *From Plan to Market*, IBRD/World Bank: Washington, D.C.

World Bank, (1999), *World Development Report 1999/2000*: *Entering the 21st Century*, IBRD/World Bank. Washington, D.C.

World Bank, (1999), *Project Information Document No PID8145*: *Tajikistan — Dushanabe Water Project*, Europe and Central Asia Region, World Bank: Washington, D.C.

World Bank, (1999), *Project Information Document No. PID8131*: *Uzbekistan — Bukhara/Samarkand Water Supply Project*. World Bank, Washington, D.C.

World Bank, (1999), *Project Appraisal Document No. 18983-KZ*: *Atyrau Pilot Water Supply and Sanitation Project*, World Bank: Washington, D.C.

Some insights into the social aspects of water pricing

Irena Lucavetchi, Compania Nationala Apele, Bacau branch, Romania

This presentation represents the opinion of a working group gathered by Solidarité Eau Europe in Paris, September 2000. The group consisted of the following persons (in alphabetical order): C. Bismuth, Solidarité Eau Europe, Strasbourg, France; P. M. Grondin, Programme Solidarité Eau, Paris, France; R. Jost, Solidarité Eau Europe, Strasbourg, France; I. Lucavetchi, as above; A. Morel à l'Huissier, CEREVE, Ecole Nationale des Ponts et Chausées, Marne la Vallee, France; L. Robaux, Office International de l'Eau, Paris, France.

INTRODUCTION, PRINCIPLES

Water is a fundamental element of life, constituting a common heritage of all nations and all people. However, not many countries recognise water as part of the national patrimony in their legislation.

Access to drinking water and sanitation is a fundamental human right. Even fewer countries recognise a legal right to water.

Equitable access to water has to be guaranteed as an element of social policy.

The management, preservation, distribution, treatment and cleaning of water generate costs, which the user has to pay.

Water prices must be established according to consumption models, and must be equitable and non-discriminatory.

INFLUENCES OF THE ECONOMIC CONTEXT ON WATER POLICY

The present economic context of Central and Eastern Europe is characterised by significant inflation, the closure of non-performing enterprises, the rise of unemployment and a widening gap between rich and poor. Furthermore, these states are undergoing a process of revision in their institutions and organisations.

In this period, privatisation in all sectors is the principal political strategy, applied to stimulate the efficiency of enterprises, or in order to find financial resources outside the national budget.

Which choice should be made in the water supply sector? Public or private management? Should there be an intermediate solution? How can social policy be served in a newly designed water sector? Pricing can have two objectives, sometimes contradictory:

- Economic efficiency;
- Social equity.

Political choice determines the manner in which these objectives are combined.

The evaluation of social needs is difficult, and, all too often, public systems will be maintained, primarily, by those least equipped for the task, less well off people.

This also occurs when revenue does not cover all the costs of the service, making subsidies necessary.

THE STATE, GUARANTOR OF SOCIAL POLICY IN THE WATER SECTOR

Breakdown of organisations involved in water pricing

- The water service establishes the costs and calculates the prices and the tariffs. 'Social' pricing is not its problem.
- The regulator establishes the general principles of water pricing and approves the price and the tariffs, in order to ensure social equity.

Should regulation take place at the national or the local level?

This depends on the political situation and institutional arrangements in each country.

Local level is, necessarily, the first level of regulation in countries with decentralised water management.

The trend to decentralisation in the CEE countries makes it necessary that the State provides the municipalities with the means to play their role.

Regions could be the second management and regulation level, particularly river basins.

The highest level remains the State (Romanian examples: the Office of Concurrence, the National Agency of Regulation for Energy).

User's role in water policy

Another stakeholder, who has been neglected for a long time, has or should have an increasing role: the user.

As a beneficiary and as a 'client' (if he pays his water bill), he must be involved permanently in all of the different issues (technical choices, management trends, costs, choice of priorities, necessity to apply the norms).

He must receive complete and objective information. Water services must demonstrate transparency as regards policy, costs, incomes, etc.

The user has the right to know 'who' does 'what'. The character of the rendered service must be exactly defined for the user.

The user must have the possibility to contribute to choices.

Point of departure — the demand

In case of water or financial resources scarcity, as is the case in the CEE countries, choices must be made.

Water system development will not be affordable and sustainable if it is based only on norms and not designed and managed to meet the needs and demands of the final users.

The issue of the actual demand must govern the decision-making process. Any analysis of social objectives must set out from the demand side more than from the supply.

All users must be considered. Moreover, within every type of use, different segments of demand must be identified and taken into account (for example, according to socio-economic criteria).

Demand can be analysed by several methods:

- Observation of willingness to pay and surveys have proven to be very helpful, but are often long and expensive.
- Other methods are available, based on service data or on the consultation of users (focus groups for example).

Being of the appropriate scale for a management based on demand, basin committees could have an important role to play.

CONCLUSIONS

The hydrographical basin: the most appropriate scale for water management

This allows improved co-operation between the different stakeholders, inside the basin committee (or similar institution), and it also enables decentralisation.

It allows global management of the resource and transboundary collaboration.

This leads to a concerted search for solutions within a participatory process. This way, the basin committee can approach possible conflicts between competing users.

The need for transparency and the establishment of an ethical code in water policies

The transparency of choices and decisions has to be ensured. This is a strong social demand.

The State, as the principal guarantor of a social policy, has to establish a charter of ethics for all the procedures and aspects of water management and must supervise its application by all the stakeholders.

The need for professional training and sharing of experience

This need is the result of fundamental changes in professional practices, existing or desirable, in water management.

The need for new organisation and financial means

New organisation and financing are necessary, in order to realise the goals of social policy in water management.

Financing can be carried out at the local level, but only if well organised and managed, responsible associations are created.

Financing has to ensure the access of the poor to the water services, though it's often difficult to know who is really the poorest.

The ultimate aim of social policy in water management must be the access of the poor to drinking water and sanitation, in satisfactory conditions.

Annex 1: **Conference programme**

Economic Instruments and Water Policies in Central and Eastern Europe: Issues and Options

Szentendre, Hungary. September 28-29, 2000.

Organised by the Secretariat of the Sofia Initiative on Economic Instruments at the Regional Environmental Center for Central and Eastern Europe (REC), and the European Commission, Directorate General Environment.

Thursday, September 28, 2000

09:00-10:15 Welcome and Introduction
Introductory remarks: *Stefan Speck* (*REC, Hungary*)
Jernej Stritih, Executive Director (*REC, Hungary*)
Ian Clark, Acting Head of Enlargement Unit (*DG Environment, Belgium*)
Zoltán Csorba (Lyonnaise des Eaux Hungária Holding, Hungary)

Objectives and format of the Conference:
Pierre Strosser (*DG Environment, Belgium*)

10:15-10:45 Coffee

10:45-13:00 Session 1. Existing water pricing policies in CEECs
Chair: *Ian Clark, Acting Head of Enlargement Unit* (*DG Environment, Belgium*)
Rapporteur: *Jim McNicholas* (*REC*)

A review of water pricing policies in Accession countries:
Pierre Strosser (*DG Environment, Belgium*)

The role of prices in the irrigation sector in Central and Eastern Europe: *Judit Rakosi* (*ÖKO Inc., Hungary*)

The illustration: water pricing policies in Croatia, Romania, Bulgaria, Estonia and the Czech Republic:
Mojca Luksic (*State Water Directorate, Croatia*)
Gheorge Constantin (*Water Resources Management Directorate, Ministry of Water, Forest and Environmental Protection, Romania*)
Galia Bardaska (*Bulgarian Academy of Sciences, Bulgaria*)
Eva Kraav (*Ministry of Environment, Estonia*)
Miroslav Hajek (*Ministry of Environment, Czech Republic*)

General discussions

13:00-14:15 Lunch

14:15-15:45	Session 2. A comparison with water pricing policies in Member States of the European Union Chair: *Eva Kraav* (*Ministry of Environment*, *Estonia*) Rapporteur: *Krzysztof Michalak* (*OECD*, *France*)
	Water pricing in Europe: synthesis from the Lille II Conference: *Andreas Krämer* (*Ecologic*, *Germany*)
	Water pricing in the Bas-Rhône-Languedoc company: *Jean-Pierre Nicol* (*BRL*, *France*)
	The illustration: water pricing policies in the United Kingdom, France and the Netherlands *Charles Whitworth* (*OFWAT*, *United Kingdom*) *Bernard Kaczmarek* (*Agences de l'Eau*, *France*) *Erik Mostert* (*Delft Hydraulics*, *The Netherlands*)
	General discussions
15:45-16:15	Coffee
16:15-17:15	Session 3. The impact of water pricing policies Chair: *Danka Jassikova-Thalmeinerova*, (*Ministry of Environment, Slovakia*) Rapporteur: *Charlie Avis* (*WWF Danube, Carpathian Programme, Hungary*)
	The impact of pricing on the household water demand: *Peter Nijkamp* (*University of Amsterdam, the Netherlands*)
	The environmental impact of water charges: *Mihaela Popovici* (*Center for Environmentally Sustainable Economic Policy, Romania*)
	General discussions
17:15-17:30	Economic instruments for water management — the role of research in the EU: *Irene Gabriel* (*European Commission, Belgium*)
19:00	Conference Dinner at the REC

Friday, September 29, 2000

09:00-10:45	Session 4. Moving towards pricing that better account for economic and environmental principles Chair: *Jean-Paul Rivaud* (*Ministry of Environment*, *France*) Rapporteur: *Erich Unterwurzacher* (*DG Regio*, *European Commission*)
	Pricing water for enhancing the sustainability of water resources: *Pierre Strosser* (*European Commission*, *Belgium*)
	Water pricing and support policies at the EBRD: *Jens Mathiesen* (*EBRD*, *United Kingdom*)

	The Environmental fund in Slovenia: *Igor Cehovin* (*ECO Fund of the Republic of Slovenia, Slovenia*)
	What role for water pricing: ten actions for internalising sustainability: *Charlie Avis* (*WWF Danube-Carpathian Programme, Hungary*)
	General discussion
10:45-11:15	Coffee
11:15-12:30	Session 5. An illustration of the issues and options related to pricing policies — water charging in the city of Gdansk (Poland) Chair: *Bernard Kaczmarek*, (*Agences de l'Eau, France*)
	The views of different stakeholders *Robert Bogdanowicz* (*Commission of Environmental Problems, City Council of City of Gdansk, Poland*) *Zbigniew Maksymiuk* (*Saur Neptun Gdansk S.A., Poland*)
	General discussion
12:30-13:45	Lunch
13:45-15:15	Session 6. Implementation issues Chair: *Mihaela Popovici* (*Center for Environmentally Sustainable Economic Policy, Romania*)
	The water pricing implementation toolkit: *Zsuzsanna Lehoczki* (*COWI Hungary, Hungary*)
	Obstacles in water pricing reforms in NIS: *Olexi Kabyka* (*ERM, CEE*)
	Social aspects of water pricing and tariffs: *Raymond Jost* (*Solidarité Eau Europe*) and *Irina Lucavetchi* (*Compania Nationala Apele, Romania*)
	General discussion
15:15-16:00	Closing session Preliminary synthesis of presentations, discussion, closing speech: *Stefan Speck* (*REC, Hungary*) and *Pierre Strosser* (*European Commission, Belgium*)
16:00	Coffee

Annex 2: **List of participants**

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ON THE COVER:

en•dan•gered spe•cies (en dān′jərd spē′shēz), **1.** a species at risk of extinction in Central and Eastern Europe because of human activity, changes in climate, changes in predator-prey ratios. **2. Ardeidae:** the family of long-legged, long-necked waterfowl, known as herons. **Platalea leucorodia:** a wading bird with a flat spoonlike bill, commonly called a spoonbill. **3. Croatian Ornithological Society:** an NGO working to save a mixed colony of herons and spoonbills in the Jelas fishponds of Croatia with the financial support of the Regional Environmental Center.

THE REGIONAL ENVIRONMENTAL CENTER FOR CENTRAL AND EASTERN EUROPE (REC) is a non-partisan, non-advocacy, not-for-profit organisation with a mission to assist in solving environmental problems in Central and Eastern Europe (CEE). The Center fulfils this mission by encouraging cooperation among non-governmental organisations, governments, businesses and other environmental stakeholders, by supporting the free exchange of information and by promoting public participation in environmental decision-making.

The REC was established in 1990 by the United States, the European Commission and Hungary. Today, the REC is legally based on a Charter signed by the governments of 27 countries and the European Commission, and on an International Agreement with the Government of Hungary. The REC has its headquarters in Szentendre, Hungary, and local offices in each of its 15 beneficiary CEE countries which are: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, FYR Macedonia, Poland, Romania, Slovakia, Slovenia and Yugoslavia.

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